PAINT and VARNISH Products

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHE

THE BRIGHTEST COATINGS IN THE WORLD

Are made with Lawter fluorescent pigments!

Perfect for all types of Safety Paints . . adds unbeatable new color appeal to coating for consumer products.

To save a life . . . or sell a product . . . here is the ultimate in brilliance of color that has no competition as an attention getter! Lawter fluorescent pigments make your coatings **4 times brighter** than the brightest shades of ordinary colors. Picture these high visibility coatings on aircraft to prevent mid-air collisions . . . on plant machinery to outline hazardous spark and milling areas . . . on industrial lift-trucks and aisle markers to prevent collisions . . . on high voltage switch boxes, fire extinguishers, emergency exits, safety helmets and first aid stations . . . on airport runways, TV towers, telephone poles and other objects to increase visibility . . . on trucks, buses, fire engines, maintenance and emergency vehicles to prevent traffic accidents . . . on thousands of different plastic, wood metal or paper products for colorful new sales appeal. The uses of Lawter fluorescent pigmented coatings are endless! Whenever you use Lawter fluorescent pigments the results are the brightest, safest, easiest-to-see colors in the world, with built-in high visibility impact that lasts! Call or write today for complete technical information.

Available in Red-Orange, Yellow-Orange, Red, Cerise Red, Pink, Gold Yellow, Lemon Yellow and Green.

Military Specification Pigments and Fluorescent Dispersions available.

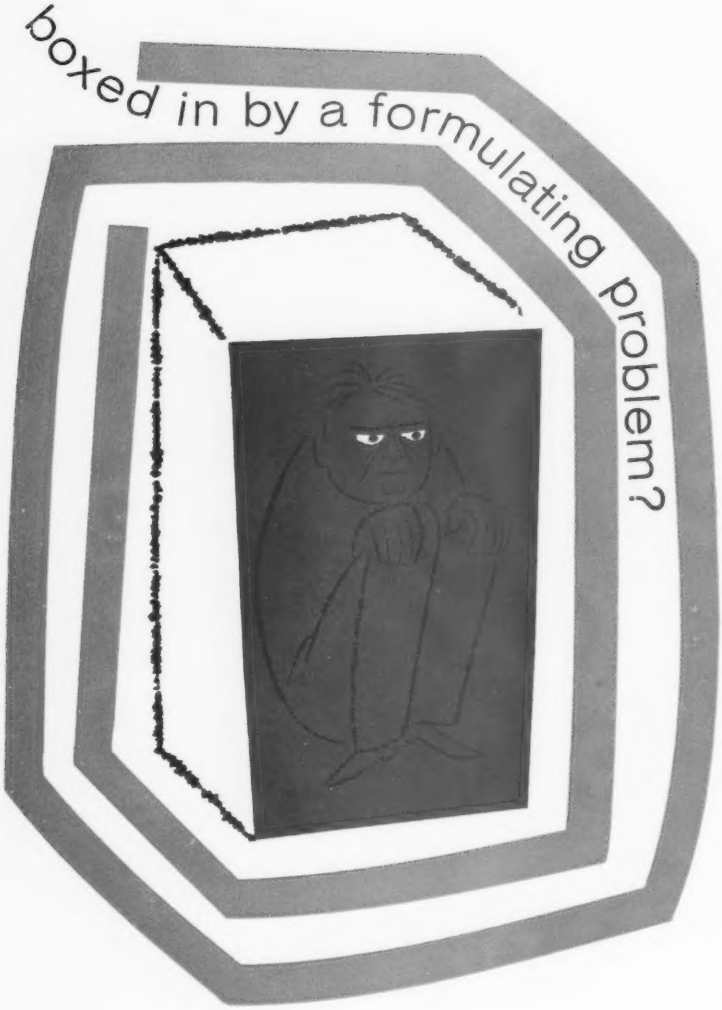
Lawter . . . Quality Leader In Resins—Through our own extensive facilities and those of our subsidiary, Krumbhaar Chemicals, Inc., of South Kearny, N.J., we are able to offer a complete line of the finest grade alkyd and synthetic resins, pure phenolics, modified phenolics, maleics, esters and specialty resins . . . all at competitive prices well worth your inquiry. Our coast-to-coast sales and service organization can be your handy source of advice on any resin problem . . . call or write today.

LAWTER CHEMICALS, INC.

3550 Touhy Avenue • Chicago 45, Illinois • AMbassador 2-8400
South Kearny, N. J. • 24 Jacobus Avenue • MArket 3-1405
San Leandro, Calif. • 595 West Avenue 135th • LOckhaven 9-3694

MARCH 1959

RCI SURFACE COATING MATERIALS ANSWER YOUR EVERY NEED!



See if *your* formulating problem isn't solved by one of these quality-controlled surface coating materials. And remember, RCI's national network of plants and warehouses assures fast, on-time deliveries, too. Write to RCI, specifying the type of surface coating you manufacture, and complete technical data will be sent promptly.

RCI BECKOSOLS—include 5 basic types of alkyd resins: phenolated, phthalic-free, rosin modified, drying oil and non-drying oil types—for a wide variety of surface coating requirements.

RCI SUPER-BECKOSOLS — new isophthalic acid alkyds which hold great promise for tomorrow's surface coatings.

RCI SUPER-BECKAMINES — melamine-formaldehyde resins for automotive finishes and appliance enamels.

RCI WALLPOLS—PVAc emulsions for sealers, flat wall coatings, spackling compounds and exterior masonry paints that are easy to formulate, easy to use.

RCI WALLKYDS — drying oil alkyd resins for flat wall vehicles (including thixotropic types and vehicles specially developed for use with odorless solvents.)

RCI BECKAMINES — thermosetting urea-formaldehyde resins for use in giving special properties to alkyd vehicles.

RCI SUPER-BECKACITES — pure phenolic resins, both oil reactive and non-reactive types, for exceptionally durable finishes.

RCI BECKACITES — maleic, fumaric and modified phenolic resins offered in a wide range of prices to meet any cost problem in varnish and vehicle manufacturing.

RCI POLYLITES — polyester resins specifically developed for metal, wood and masonry coatings with outstanding properties.

RCI EPOTUFS — a complete line of epoxy resins and hardeners especially suited to production of corrosion resistant metal coatings. Choose either liquid resins or resin solids in solution. Esters available, too.

RCI ACRYLICS — acrylic emulsions for the manufacture of aqueous architectural and industrial finishes.

RCI STYRESOLS — styrenated alkyd resins. **BECKOLINS**—synthetic oils. **KOPOLS**—processed Congo copals. **SYNTHE-COPALS** — ester gums. **PENTACITES** — pentaerythritol resins. **BECKOPOLS**—high melt point modified phenolic resins. **LUSTRASOLS** — acrylic solutions for industrial finishes.

IMPORTANT: orders for RCI resins, chemicals and colors can often be combined to earn applicable quantity prices.

REICHHOLD

Creative Chemistry . . . Your Partner in Progress

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N.Y.

RCI

he'll help solve your solvent problems

This man is a Sinclair sales engineer. He is not on your payroll, but his job is to serve you in every way he can. His knowledge of chemistry and background in chemical engineering make him particularly qualified to offer you technical assistance on your solvent problems. Furthermore, he is prepared to discuss the advantages to you of Sinclair's full line of solvents and chemicals including—

Truly odorless solvents—SINCLAIR ODORLESS SOLVENTS, both Light (345-400°F) and Heavy (375-465°F), synthetically produced from carefully selected hydrocarbons to insure uniformity, stability and superior quality required by manufacturers. Available in transport trucks and full, or split tank car quantities from strategically located shipping points.

High purity aromatics—TOLUOL (1° nitration grade), XYLOL (5°) and 110 SOLVENT (320-353°F, KB92.3) produced by modern Udex extraction facilities. Available in transport truck and full, or split tank car quantities.

Your Sinclair sales engineer follows through. You can be sure that your orders will arrive at your plant exactly as specified—*and on time.* We are sure you'll benefit from a meeting with him. If you use odorless solvents or aromatic solvents, phone your Sinclair Representative or write:

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PETROCHEMICALS, INC.

Subsidiary of Sinclair Oil Corporation
600 Fifth Avenue, New York 20, N.Y.
155 North Wacker Drive, Chicago 6, Ill.

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Convenient Service on:

Hercules Improved Technical PE and Mono-PE;

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Hercolyn,® Abalyn,® and Abitol®;

Hercoflex® plasticizers;

and other chemical raw materials for the manufacture of protective coatings and printing inks

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Boston 16, Massachusetts, 200 Berkeley Street
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Houston 6, Texas, 3520 Montrose Boulevard
Los Angeles 5, California, 3460 Wilshire Boulevard
New York 17, New York, 380 Madison Avenue
St. Louis 5, Missouri, Siteman Building
San Francisco 4, California, 120 Montgomery Street
Wilmington 99, Delaware, Delaware Trust Building

SP59-1

Synthetics Department

HERCULES POWDER COMPANY

INCORPORATED

900 Market Street, Wilmington 99, Delaware

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VOL. 49 MARCH, 1959 NO. 4

REVIEW and BUYERS' GUIDE ISSUE

MEMBER BUSINESS BPA PUBLICATIONS AUDIT, INC.

for the Paint, Varnish, and Lacquer industry

solvents

acetone
ethyl acetate
isopropyl acetate
isobutyl acetate
n-butyl acetate
2-ethylisohexyl acetate
isobutyl alcohol
2-ethylhexyl alcohol
Tecsol®
(95% proprietary ethyl alcohol)

film formers

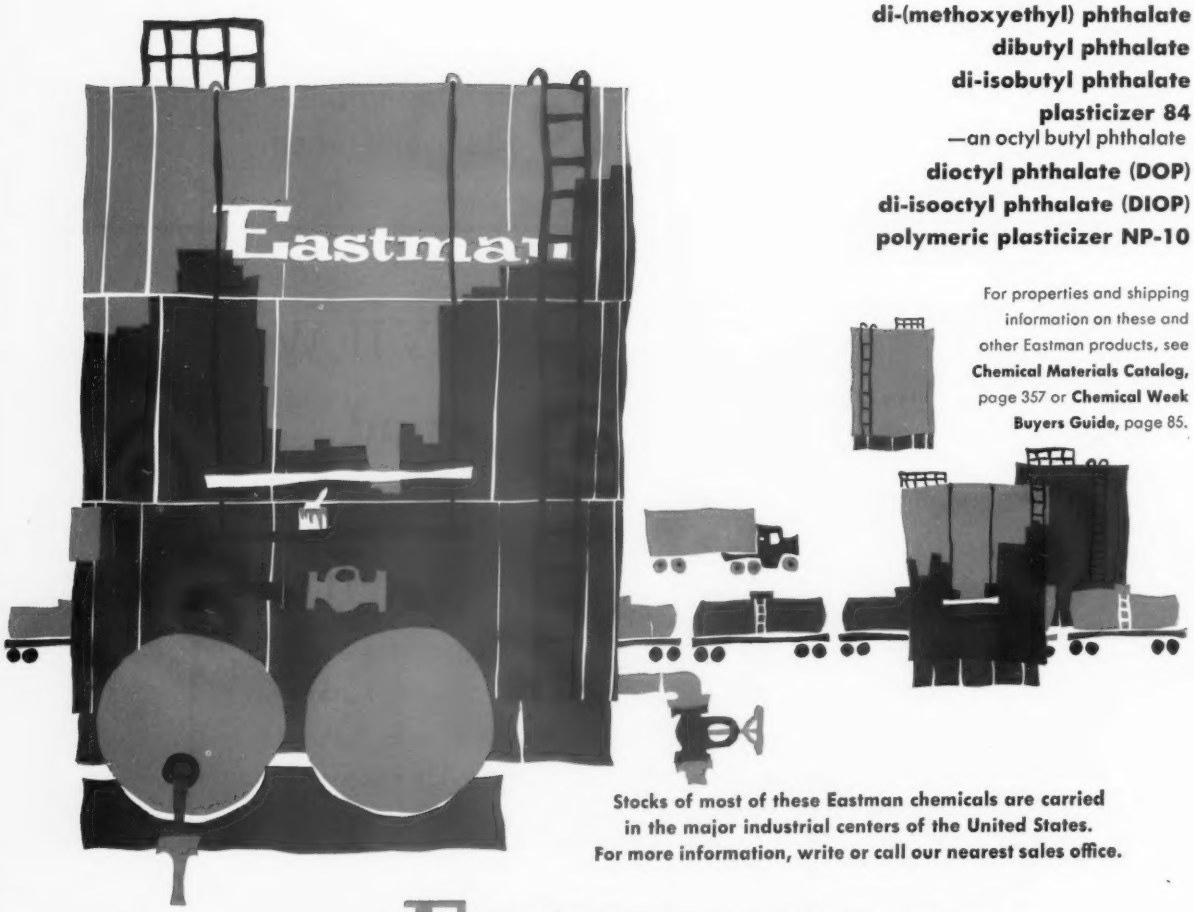
cellulose acetate
cellulose acetate butyrate

modifier

sucrose acetate isobutyrate (SAIB)

plasticizers

dimethyl phthalate
diethyl phthalate
di-(methoxyethyl) phthalate
dibutyl phthalate
di-isobutyl phthalate
plasticizer 84
—an octyl butyl phthalate
dioctyl phthalate (DOP)
di-isooctyl phthalate (DIOP)
polymeric plasticizer NP-10



For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog,** page 357 or **Chemical Week Buyers Guide,** page 85.

Stocks of most of these Eastman chemicals are carried in the major industrial centers of the United States. For more information, write or call our nearest sales office.

Eastman CHEMICAL PRODUCTS, INC.

KINGSPORT, TENNESSEE, subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Chicago; Cincinnati; Cleveland; **Framingham, Massachusetts;** Greensboro, N. C.; Houston; New York City; St. Louis. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

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SANDOZ

Graphtol
ORGANIC PIGMENTS

DRY COLORS

AQUEOUS DISPERSIONS
Pastes and Powders

PRESSCAKE

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HOW TO USE THE REVIEW AND BUYERS' GUIDE

THIS years' REVIEW and BUYERS' GUIDE represents the seventh in a series of yearly summaries covering the technological developments in the paint industry. The series form a valuable index to the technical literature and a source of information relating to the various phases of paint technology.

The format of this special issue is divided into three sections: The Buyers' Guide Section, World Wide Review of 1958, and the Directory Section.

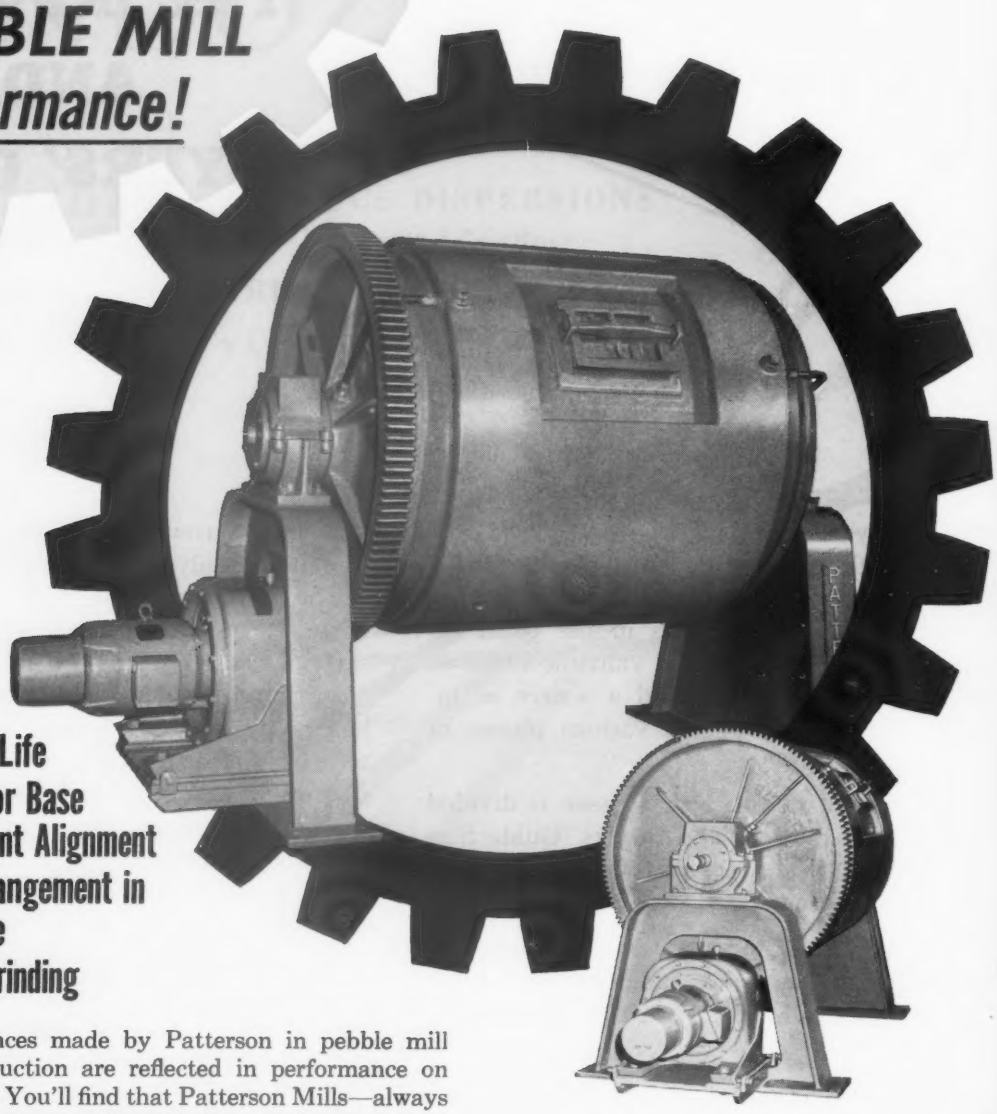
The Buyers' Guide section is a digest of important raw materials and equipment which were made available to the coatings industry during 1958.

The World Wide Review section covers the technical developments which occurred during 1958 in the following fields: Synthetic Resins, Latex Emulsions, Drying Oils and Derivatives, Solvents and Intermediates, Pigments, Driers and Additives, Production, Industrial and Architectural Coatings, Corrosion, and Aerosols, Performance Testing and Chemical Analysis.

The literature survey that forms the World Wide Review of 1958 section incorporates several changes that will increase its usefulness to the reader. Breakdown by subject has been altered to accord with current interests; for example, a detailed section on Corrosion has been included. The bibliographies are listed under individual fields and appears at the end of the entire text (page 150), so that those interested in reviewing the literature, whether for the entire field of paint technology or for a particular subject, will have at hand a compilation of over 550 references.

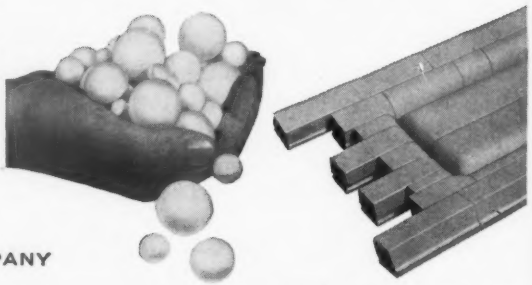
The Directory section includes seven different listings. A newcomer to this section is the Aerosol Suppliers' Directory. Another addition is the Canadian and Mexican addresses of U. S. suppliers serving the paint field. All directory listings have been expanded and brought up-to-date over last years' publication.

progress with *Patterson* in PEBBLE MILL *performance!*



- Longer Gear Life
- Integral Motor Base for Permanent Alignment
- Compact Arrangement in any Mill Size
- Finest Fine Grinding

The steady advances made by Patterson in pebble mill design and construction are reflected in performance on *your* grinding jobs. You'll find that Patterson Mills—always the leaders in economical fine grinding at lower costs—today offer greater values than ever before, thanks to continuing research and development. Whether you grind chemicals, pharmaceuticals, pigments, ceramic compositions or any of scores of other materials, it will pay you to check your needs with Patterson's engineers. Their experience is at your disposal. Write today!



High density, tough bond ARLCITE grinding balls and mill lining blocks—for the ultimate in high speed grinding, economy and endurance. *A product of the Porcelain Division, Ferro Corp.*

THE *Patterson* FOUNDRY AND MACHINE COMPANY
A Division of Ferro Corporation
East Liverpool, Ohio

THE *Patterson* FOUNDRY AND MACHINE CO. (CANADA) LTD.
Toronto, Ontario

CITE
ks—
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oduct
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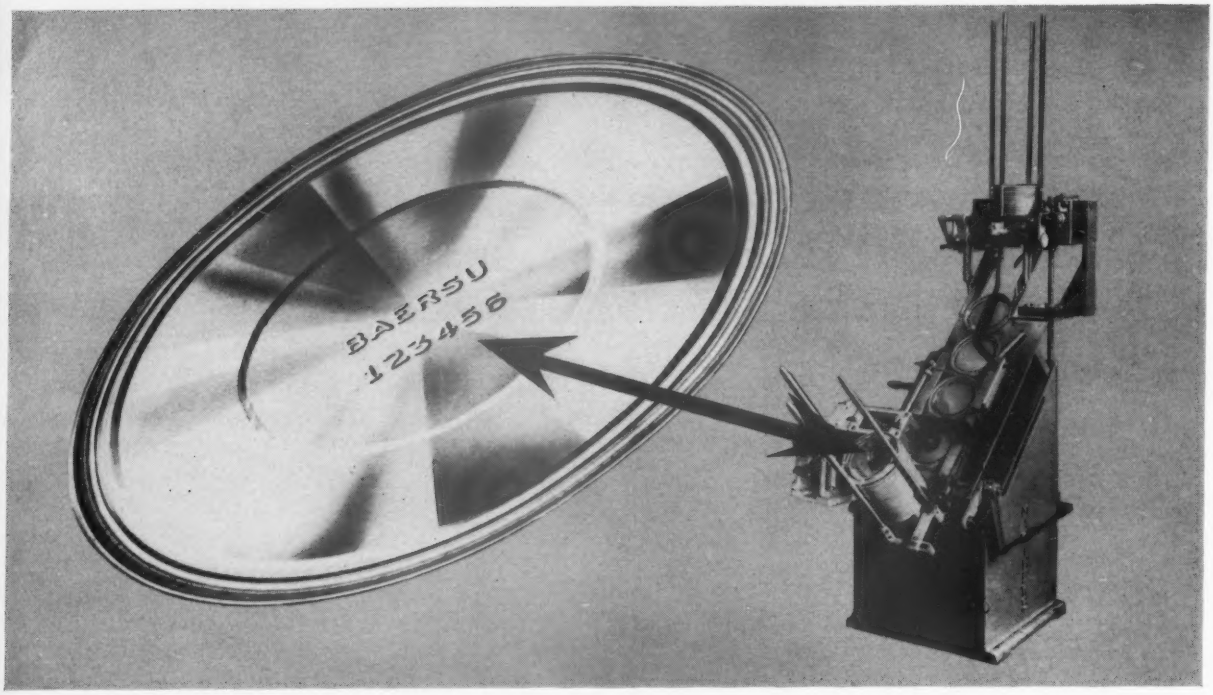
BUYERS' GUIDE

PACKAGING

MATERIAL HANDLING

NEW EQUIPMENT and MATERIALS



Can Lid Coding YOU CAN COUNT ON!

For can lid marking that's Permanent, Legible and Fast . . . it's the Matthews New Model No. 3200 Embosser. If you use temporary or removable marking that may be smudged, obliterated or blurred, you should use the method that so many leaders in the paint and associated industries have standardized on . . . the Matthews production embosser. The marking is fixed in the metal itself, in smooth raised characters, and at speeds as fast as you desire.

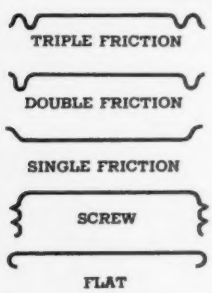
If you fill and cap 100 or 10,000 cans . . . whether ¼ pints or gallons . . . round, oval or square . . . find out more about this naturally easy, economical marking method.

PERMANENT . . . the coding will last the life of the container.

LEGIBLE . . . each character is embossed to a full, uniform height.

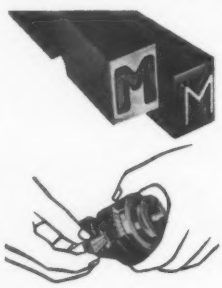
FAST . . . up to "5700" completely coded can lids per hour.

For all lid styles and sizes



The standard No. 3200 and the No. 3201 are designed to accommodate single, double or triple friction style lids. These models can also be equipped to handle flat, square, rectangular or oval lids, if required. The No. 3202 and No. 3203 are designed to automatically handle double and triple friction style lids. All models are adjustable through a wide range of lid diameters.

Roller type action



One, smooth rolling action provides continuous embossing of one or two lines of coding in the can lids as they pass between the carefully engraved interchangeable rollers. The simplicity of the Rotary Action design provides freedom from mechanical failure and maximum embossing efficiency. Easily changed male and female embossing type are engraved with 3/16" size characters.

MODEL No. 3200	MODEL No. 3201	MODEL No. 3203	MODEL No. 3202
Gravity Feed	Automatic Stacking	Automatic Feed	Automatic Feed and Stacking

Write today for completely illustrated brochure–Bulletin C-12.

JAS. H. MATTHEWS & CO.
3931 FORBES AVENUE
PITTSBURGH 13, PA.
Offices in Principal Cities
Write, Call or TWX PG 424

NEW EQUIPMENT AND MATERIALS

This section contains a compilation of new materials and equipment introduced in 1958. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.

A

RELIANCE

A-C. MOTOR
Weatherproof

Weatherproof a-c. motor for use in "outdoor" type applications where motor is subject to extreme moisture or the elements.

Available in all standard speeds in sizes from one through 250 horsepower.

Open motor said to exceed NEMA splash-proof requirements. External parts of corrosion proof cast iron. Insulation system is completely non-hygroscopic. It features silicone sleeving, glass-mica slot liners, and glass mat top-sticks and mid-sticks.

Rotor O.D. and stator I.D. are coated with a rust inhibitor. Water-tight conduit box is cast iron with a gasketed cover and threaded outlet.

Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

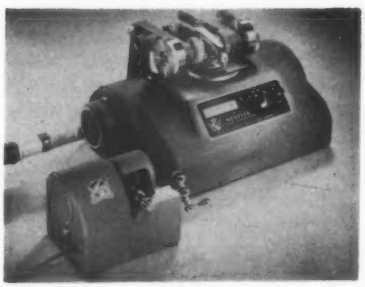
ABRASION TESTER
With Improvements

The 1958 Model Taber Abrasion Testing Set consists of laboratory abraser and wheel refacer (115 volts, 50 or 60 cy.) plus accessories and supplies.

The improved Model 174 Abraser incorporates a built-in motor with worm reduction drive for uniform high torque, automatic "stop" electric counter and new selector circuit, which insures that each abrasion cycle is counted exactly.

Motor-driven fan forces cooling air around motor and through interior of aluminum housing. Model 200 Wheel Refacer said to precision dress abrading wheels of abraser. Wheel refacer incorporates capacitor-type heavy duty motor, sealed bearings and oversized motor shaft in aluminum housing.

Taber Instrument Corp., Dept. PVP, Section 233, N. Tonawanda, New York.



TABER

ACETATE SOLVENTS
For Polyurethane Coatings

Two solvents, Cellosolve acetate 99 per cent (polyurethane grade) and ethyl acetate 99.5 per cent (polyurethane grade) available for use in urethane resin surface coatings.

Low water, acid and alcohol content of these solvents said to insure stable resin solutions with minimum loss of isocyanate during storage.

Union Carbide Chemicals Co., Division of Union Carbide., Corp Dept. PVP, 30 E. 42nd St., New York 17, N. Y.

ACRYLATES
Low Inhibitor Grades

Low inhibitor grades of methyl acrylate and ethyl acrylate are now available.

Products, containing 0.02 per cent of inhibitor, are specially designed for polymerization and co-polymerization without necessity for inhibitor removal, according to manufacturer. Small amounts of inhibitor in products said to be overcome by use of proper quantity of polymerization catalyst.

Samples on request from Special Products Dept., Rohm & Haas Co., Dept. PVP, Washington Square, Philadelphia 5, Pa.

ACRYLIC EMULSION
With Higher Solids

Rhoplex AC-55, a modifcation of Rhoples AC-33, has been developed to provide higher solids.

New product contains essentially the same acrylic polymer with a minor modification. Emulsifying system, however, is different. New emulsion said to provide wider acceptance for tube colors. Emulsion is producted in an anionic system, and has no thickener, permitting a greater degree of freedom in formulation development.

New emulsion said to be fully comparable to older one in exterior applications. Differences in flow and leveling are slight, but in favor of AC-55. Product said to show little, if any, tendency to stratify on standing, but tends to dry or skin more rapidly at the liquid level, like most concentrated emulsions.

Rohm and Haas Co., Dept. PVP, Washington Square, Philadelphia 5, Pa.

ACRYLIC SOLUTION

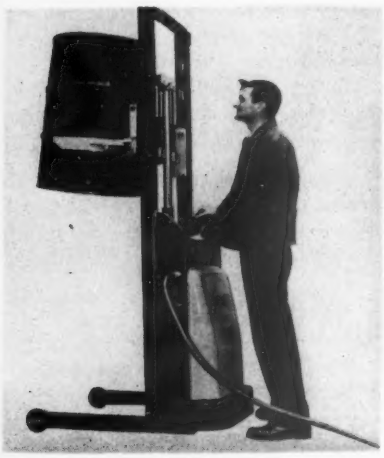
Good Adhesion & Hardness

Acrylic polymer solution, Acryloid B-44, now available in commercial quantities as a 40% solution in toluol.

Acryloid resin said to be particularly noteworthy for the hardness and adhesion of its films. Fast solvent release and excellent pigment dispersion claimed to permit the formulation of Acryloid B-44 in coatings with as high as 45/55 pigment-to-binder ratio, yet with the retention of good gloss.

Water-white color, resistance to discoloration on aging, outstanding flexibility of the film, and excellent durability of this solution are typical of the acrylic coatings system.

Rohm & Haas Co., Dept. PVP, Washington Square, Philadelphia 5, Pa.



AMERICAN PULLEY

AIR-POWERED HAND TRUCK

For Use in Hazardous Areas

Air-powered portable elevating truck designed for use in hazardous locations where maximum protection against fire or explosion causing sparks is required.

Available in all models, air-powered unit permits powered load-lifting in such areas as refineries, gasoline storage areas and small garages.

Quick disconnect couplings said to permit convenient, easy attachment to any air line in the plant.

Designed to handle loads up to 1500 lbs. Trucks have exceptional versatility.

The American Pulley Co., Dept. PVP, Philadelphia, Pa.

AIR-POWERED HOIST

Roller or Link Chain

Master Power #105 series hoists with lifting capacities of 1000 and 2000 lbs.

Available with either manual up and down control or pendent control. Weighs only 27 lbs. and the rate of lift is 46 ft. per minute, with 1000 lbs. at 90 p.s.i.

Seven spring-loaded blades claimed to give excellent feathering control of lifting or lowering loads.

Has built-in oil resevoir, oil regulator and filter unit, and inlet is swiveled to eliminate strain on air connections.

Master Pneumatic Tool Co., Inc., Dept. PVP, Bedford, Ohio.

AIR-POWERED PUMP

Eliminates Contamination

Lightweight, air-powered pump of stainless steel permits minute quantities or volume delivery of fluids directly from original shipping containers.

Pumping of liquids and semi-fluids from two-inch end bung or open head of original drum assures contamination-free supply. Stainless steel lower assembly quickly and easily removed from power head without use of tools for complete cleaning.

Air-operated power head eliminates danger of sparking and high cost wiring. Said to produce equal delivery on both up and down strokes for smooth, continuous flow, with no pressure on the drum. One man operation.

Gray Co., Inc., Dept. PVP, 1016 Sibley St. N.E., Minneapolis 13, Minn.

GRAY

ALKYD RESIN

Formulating Baking Enamels

Development of a new alkyd resin, designated as Glyptal ZA-114 solution, for use in formulating baking enamels requiring color and gloss retention at temperatures in the 400F range.

Resin bridges the gap between the hear resistance of conventional saturated oil-modified alkyds and silicones in imparting superiority of overbake and gloss retention to alkyd-melamine baking enamels. Such formulations also have excellent hardness, flexibility and adhesion.

Combinations of ZA-114 with urea-formaldehyde or melamine-formaldehyde resins said to result in approximately twice the baked hardness of conventional saturated oil-modified, alkyd-amine resin blends, without any sacrifice in flexibility and adhesion.

Properties of extreme baked hardness, combined with good adhesion, flexibility and excellent overbake color and gloss retention, are claimed.

Chemical Materials Department, General Electric Co., Dept. PVP, Anaheim, Cal.

ALKYL BORIC ACIDS

With Fungistatic Properties

Three alkyl boric acids (alkyl, dihydroxy, boranes) have been made available in research quantities.

Chloropropyldihydroxyborane ($ClC_3H_6B(OH)_2$) is a white crystalline material. Dihydroxynonylborane ($C_9H_{19}B(OH_2)$) and dihydroxydodecylborane ($C_{12}H_{25}B(OH)_2$) are colorless liquids. Materials are said to be much weaker acids than unsubstituted boric acid and are stable in water solution. Anhydrides are trialkyl boroxins.

Bacteriostatic and fungistatic properties of the acids and low surface tensions of their aqueous solutions are useful. They might also be used as intermediates for the formation of organic-inorganic polymers and as gasoline additives.

Callery Chemical Co., Dept. PVP, Callery, Pa.

ALUMINUM COMPOUND

For Gelling Alkyds

Phelate 77, a reagent useful

in cross-linking polymers containing hydroxyl groups, said to be an easily handled, non-toxic liquid. Can also be supplied without solvent, if required.

Particularly useful in producing gelled alkyd vehicles which contribute thixotropic structure to coating compositions. Gels formed are smooth, uniform, and free from seed.

J. W. Ayers & Co., Dept. PVP, 640 North Thirteenth St., Easton, Pa.

ALUMINUM PASTE
For Use With Alkyd Vehicles

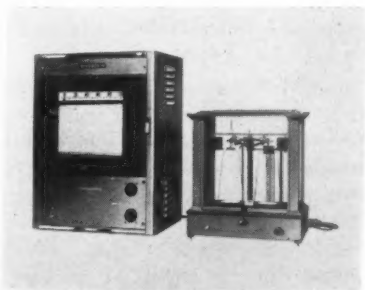
Aluminum paste with improved performance for alkyd and other type synthetic resins.

Designated "Perma-Leaf" No. 7-311 paste, the product maintains leafing in many paint vehicles which normally cause deleafing within a few days.

Has been used successfully with some alkyds, alkyd melamines, urea formaldehydes, and vinyls.

The following characteristics are listed for the paste: NVM 70% minimum, screen retention 325 mesh 1.0% maximum, weight per gallon 12.12, and specific gravity 1.45.

Reynolds Metals Co., Dept. PVP, Richmond 18, Va.



AINSWORTH

ANALYTICAL BALANCE
Automatic Type

Automatic recording, analytical balance shows instantaneous weight and rate of weight change, according to manufacturer.

Samples may be placed on balance pan or suspended in controlled environment above or below the balance. Capacity is 200 grams. Weight changes for long or short periods recorded on chart 11 inches wide representing 110 mg.

Accuracy and readability are ±1/10 mg. Balance automatically adds or subtracts weights as required to rescale recorder pen. Range of automatically controlled weights is four grams.

Wm. Ainsworth & Sons, Inc., Dept. PVP, 2151 Lawrence, Denver 5, Colo.

ANTIFOAMS
Fast-Acting

"Sag" antifoams, fast-acting and highly effective foam killers for industrial use have been placed on the market.

New products come in two forms—"Sag" 47 silicone antifoam fluid for non-aqueous systems and "Sag" 470 silicone antifoam emulsion for aqueous foaming systems.

"Sag" 47 is a 100% solids solution which can be used at full strength, or as a solvent solution, or blended with other materials.

"Sag" 470 contains 10% silicone solids by weight, and is ready for use, but can be further diluted if desired.

These antifoams are chemically inert and resist oxidation over long periods. Their toxicity is said to be extremely low.

Silicones Division, Union Carbide Corp., Dept. PVP, 30 E. 42nd St., New York 17, N.Y.

AQUAGEL
Bodying Agent

Aquagel, a silicated polyalcohol bodying agent for water-based paints has been introduced.

Intended primarily as a thickener to be added in solution form as last item in a given formulation to give desired viscosity increase.

Claimed to be completely stable and gives cloudy solutions. Incorporation by hot or cold water may be used, though hot water will give a higher final viscosity.

Troy Chemical Co., Dept. PVP, 338 Wilson Ave., Newark 5, N.J.

AUTOCLAVE
Low-Pressure

Small, low-pressure autoclave for laboratory use.

Designed to give one gallon capacity for operation to 350°C. Two models—one for pressure to 600 p.s.i., the other for pressure to 1200 p.s.i.—available.

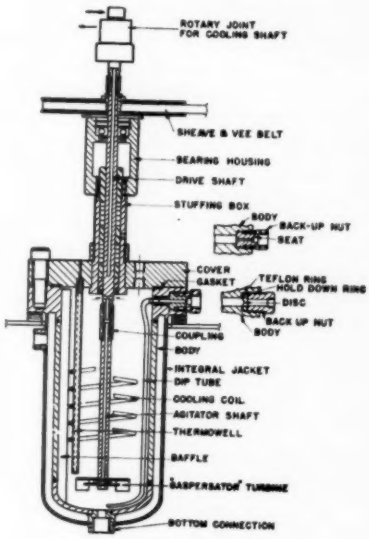
Agitation supplied by a flat blade turbine or by propeller.

Packing and shaft guaranteed for minimum of 500 hours operation. Cover and stuffing box are separable. Closure design of flat bolted type with fully confined gasket.

Openings through body flange rather than cover.

Standard units of 316 stainless steel. Rupture assemblies and thermowell are standard equipment.

Pressure Products Industries, Inc., Dept. PVP, Hatboro, Pa.



PRESSURE PRODUCTS

AUTOMATIC MICRO-PRINTER
Quick-Change Cylinder

Switching of package imprints and code numbers during production changeovers said to be accomplished in an instant with quick-change plate cylinders called Cozzone Automatic Micro-Printer.

Loosening the cylinder nut permits removal of plate cylinder sleeve for replacement with new imprint.

Available in 18 models offering cylinder circumference ranging from 9" to 36". Can be attached to any type of existing or new packaging machinery.

Printer offers option of two-way drive. Position of roller adjusted by numbered and calibrated micro-dials.

Cozzone Marking Co., Dept. PVP, 18 Nuttman St., Newark 1, N. J.

COZZONE

AUTOMATIC SELECTOR
Comprehensive Mixing Aid

Selector, called the Pneumix Capaci-Dial, said to automatically tell the best Pneumix agitator for each liquid batch mixing problem.

By turning pointer to size of batch to be mixed, the right agitator is indicated.

Eleven Pneumix models are offered capable of mixing from 5 to 2400 gallons. Claimed to be explosion-proof, burn-out proof and light weight.

Eclipse Air Brush Co., Dept. PVP, 390 Park Ave., Newark 7, N. J.

AZELAIC ACID
Low Temperature Flexibility

High-purity azelaic acid for use as an intermediate in the formation of dibasic acid esters for low temperature plasticizers is now being produced on pilot plant basis.

Esters produced from product said to have improved heat stability and corrosion inhibition qualities. Aliphatic diesters found useful where applications involve extreme operating conditions.

Armour and Co. Chemical Division, Dept. PVP, 1355 W. 31st St., Chicago 9, Ill.

B

BARREL GRAB
Of Heavy Welded Steel

Barrel grab has been designed for picking up any type of wood or steel barrel from 40 inches diameter to small nail keg size without damaging interior or exterior of container.

Grab is designed on toggle principle, the heavier the load, the more rigidly it is held. Grab is constructed of heavy welded steel chains with tongs made of heavy steel bar stock. Weighs approximately 35 pounds.

Available in two standard sizes, half ton and one ton. Palmer-Shile Co., Dept. PVP, 12622 Mansfield, Detroit 27, Mich.

PALMER

BARREL HANDLER
Remote Control

Barrel lifter-tipper-stacker has been made available.

Unit lifts drums or barrels to any desired height, then by remote control, the drum is tipped forward or backward or revolved in a complete 360 degree circle.

Unit quickly adjusted to fit any size drum or barrel and attaches instantly while the drum is in either a horizontal or vertical position.

Tipping action is sensitive and is said to be controlled extremely accurately.

Barrel handler unit can be easily removed from the Stratton Multi-Lift, which can then be converted to a forklift, platform, or crane.

The Stratton Equipment Co., Dept. PVP, 2030 East 105th St., Cleveland 6, Ohio.

STRATTON

BARREL HANDLING UNIT
Motor-Driven Vacuum Pump

Newly designed barrel handling unit attached to fork lift truck lifts four 55-gal. steel drums, each weighing 490 lbs.

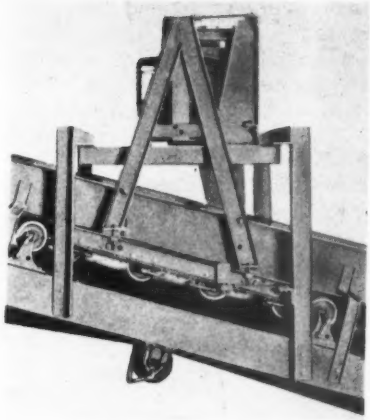
Source of power for this unit is an hydraulic motor-driven vacuum pump designed to operate in conjunction with the regular hydraulic system of the fork lift truck.

Each unit equipped with a dashboard panel control which allows operator to lift or release one, two, three, or four barrels collectively, individually, or in any combination. When vacuum pads grip barrel securely, a light shows on control panel and indicates barrel is ready for lifting and moving.

Barrels evacuate themselves to atmosphere rather than using the normal "blow-off" system; this means the elimination of excessive hose connections and pulley systems.

Vac-U-Lift Co., Dept. PVP, Salem, Ill.

VAC-U-LIFT



WEIGHT & CONTROL

BELT CONVEYOR SCALE
Fixed or Variable Speed Conveyor

Unitized, pneumatic, belt conveyor scale which is easily installed on existing flat-belt or trough-type conveyors with a minimum of downtime and only slight modification to the conveyor. Unit can be adapted to either fixed or variable speed conveyors.

The W-C belt conveyor scale is available in a variety of sizes to handle a large range of capacites.

Scale employs a flexural frame arrangement and uses no knife edges, pivots, or bearings.

Weight & Control Compenents, Inc., Dept. PVP, 802 Lincoln Rd., Hatboro, Pa.

BENZOGUANAMINE
Resin Intermediate

Benzoguanamine, an organic chemical said to be adaptable to a wide variety of uses in the paint industry is now commercially available.

The chemical is a member of the triazine family, and is similar in many respects to melamine. Chemical is produced in form of free-flowing white crystals, and has mild organic odor. Relatively non-toxic, according to manufacturer.

Benzoguanamine reacts with formaldehyde and alcohol to form triazine resin, and may be processed with same equipment and techniques used for melamine.

Tennessee Products and Chemical Corp., Dept. PVP, 326 Union St., Nashville, Tenn.

BRONZE POWDERS
In Four Shades

Four shades of bronze powders are available for incorporation into metal spraying compounds.

Three shades are for regular paint formulas, the fourth is for anti-fouling paint. Additional shades for picture frame and moulding paint are also included in the line. Colors vary from pale gold to deep copper.

Hummel Chemical Co., Inc., Dept. PVP, 90 West St., New York 6, N. Y.

BURETTE
Up To 350°F.

New burette, called Thermette, developed to measure and deliver small quantities of heated liquids. The heating system of the burette can maintain up to 350°F.

Burette enclosed in a glass cylinder. Furnished for surface mounting by means of flanges at the top and bottom.

Special pyrex tube is graduated in ml. and heating is by means of a transparent conductive coating on the outer surface of the glass.

Burette terminates in a ¼" glass pipe tubulation fitted with a standard ¼" pipe flange. This flange can be furnished with adapters to any type of glass, metal, plastic tubing, or piping.

Two sizes available with capacitites of 340 or 820 ml. Reading is facilitated by a fluorescent light extending the full length.

Pressure Products Industries, Inc., c/o Charles D. Karlsruher Dept. PVP, 1707 Melrose Ave., Havertown, Pa.

C

CALCIUM CARBONATE
For Flat Wall Paints

A low-cost grade of dense-type precipitated calcium carbonate called "Carbium."

As an extender for flat wall paints, "Carbium" said to provide uniform flattening at high pigment volume. It gives reduced streaking, flashing or ghosting of medium shades and deep tones.

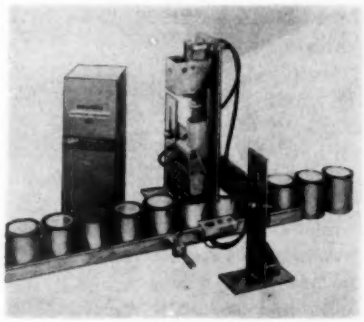
Other advantages claimed in its use as a paint filler include partial dry hiding without sacrificing color uniformity, relatively good grindability with low abrasion, and low polishing when rubbed.

Diamond Alkali Co., Silicate-Detergent-Calcium Division, Dept. PVP, 300 Union Commerce Building, Cleveland 14, Ohio.

CAN CODER
Prints on Tops or Bottoms

Bowers automatic can coder, designed in Canada, has been made available.

Claimed to print on either tops or



J. M. LEHMANN

bottoms of cans and that the special opaque quick-drying ink penetrates the palm oil in which cans are usually immersed, leaving a permanent code marking.

Said to print on containers in motion in any direction, without smearing. The action permits printing on cans of slightly different height without adjustment.

Coder fits on all types of can closing machines and has a capacity of sixty cans per minute. Handles containers from 1/32 to one gallon in capacity. Prints up to three lines of 12 characters each and is available for either pneumatic or electric operation in any voltage.

J.M. Lehmann Co., Inc., Dept. PVP, Lyndhurst, N.J.

CASE IMPRINTER
On Corrugated Cases

Manually operated machine that imprints contents, brand and distributor or packer name and address on the ends of shipping containers.

New Carton Printer which can imprint copy legends up to 9" wide by 6" high on cartons is a compact, portable low price unit. In addition, it is claimed to have great flexibility in copy changes and carton size adjustments.

Carton Printer imprints the ends while the carton is made up and empty. Operator places the carton

over a shelf, pulls a lever and makes an imprint. The machine is extremely easy to operate and requires no skill. This results, it is claimed, in a simple machine that produces high quality results.

Rotary Imprinter, Inc., Dept. PVP, P. O. Box 31, Hillside 5, N. J.

CELLULOSE GUMS
Water-Soluble

Methocel 60HG, Methocel 70-HG and Methocel 90HG now available.

Products feature improved organic solubility, higher thermogelation characteristics and special emulsion stabilization properties.

Available in wide range of viscosities. Are nonionic, inert and equivalent to Methocel MC U.S.P. grade in chemical purity.

Organic Chemical Sales, Dow Chemical Co., Dept. PVP, Midland, Mich.

CHARLES ROSS

CHANGEABLE CAN MIXER
Double Planetary Stirring

Changeable can mixers incorporating double planetary stirrer action.

Also features vacuum tight covers. Mixers can be provided with jackets on cans for heating and cooling material during mixing when required.

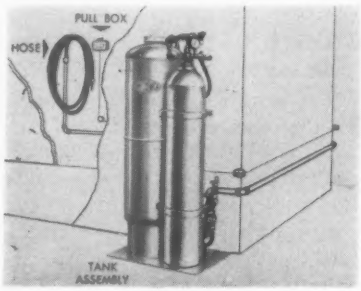
Driven by variable speed motor drive and are obtainable in various sizes from the one-gallon laboratory size up to 150-gallon working capacity size.

Charles Ross & Son Co., Dept. PVP, 148-156 Classon Ave., Brooklyn 5, N.Y.

CHEMICAL SYSTEMS
Full Remote Controls

Complete remote control from a distant hose site pull box is one of several features of the new stationary dry chemical hose line systems.

A single pull handle at the hose site simultaneously opens the valve, pressurizes the tank, and fills the system with fire-killing chemical powder.



FYR-FYTER

Other features include space-saving installation, improved nozzles and valves, and use of the new Formula H chemical powder with its proven heat-and-moisture resistance.

Three models are offered—150, 300, and 500 pound dry chemical capacity—in compact "package" designs requiring a minimum of floor space.

The Fyr-Fyter Company, Dept. PVP, 221 Crane Street, Dayton 3, Ohio.

CHLORINATED COMPOUNDS
Semi-Commercial Quantities

Six chlorinated compounds utilizing p-xylene as the basic raw material have been made available in semi-commercial quantities.

Three ring chlorinated compounds are indentified as 2-chloro-p-xylene, 2,5-dichloro-p-xylene and 2,3,5,6-tetrachloro-p-xylene. Three chain chlorinated compounds are a-chloro-p-xylene, a, a′-dichloro-p-xylene and a,a′-hexachloro-p-xylene.

Chain chlorinated materials may be used as chemical intermediates in production of fungicides, dibasic acids and aromatic diols or glycols. Suitable for production of polyesters and polyethers for paints, enamels and lacquers and other protective and decorative industrial coatings. Ring chlorinated materials may find use as solvents.

Diamond Alkali Co., Product Development Dept., Dept. PVP, Research Center, Painesville, Ohio.

CHROME YELLOWS
Exceptional Lightfastness

New line of chrome yellows available at base price of $.35 per pound.

These regal yellows said to show up cleaner and brighter after exposure than conventional types.

Useful in exterior paints and enamels as well as in other applications.

Said to have improved alkali resistance.

Imperial Paper & Color Corp., Pigment Color Division, Dept. PVP, Glens Falls, N. Y.

CLAMP ATTACHMENT
Non- & Palletized Loads

Both palletized and non-palletized loads, as well as those on skids and in bins, said to be handled easily and efficiently by a clamping attachment called the Master Universal Clamp.

Multi-purpose attachment available on all of the firm's electric fork lift trucks.

Has a clamping range from 18 to 46 inches or 23 to 60 inches, depending on the materials being handled.

Controls for operating can be firmly held in any position of closure and are located at the driving position.

Lewis-Shepard Products, Inc., Dept. R8-14, Dept. PVP, 125 Walnut St., Watertown 72, Mass.

COLOR-ANALYZER
Percent Reflectance Readings

Color analysis instrument said to permit extremely accurate readings in percent reflectance of paints, dyes and variety of other products.

Instrument consists of Spectronic "20" spectrophotometer and a reflectance attachment.

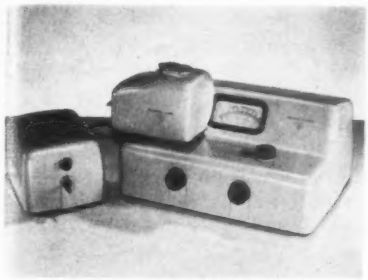
Allows convenient examination of various sized samples.

Analyzer claimed to contain true spherical integrator.

Eliminates need for glass filters. Machine will operate without fluctuation on 50 or 60 cycles. Re-

quires a warm-up period of only five minutes.

Bausch & Lomb Optical Co., Dept. PVP, Rochester, N. Y.



BAUSCH & LOMB

COLOR DISPENSER

Electronically Matches Colors

Color dispenser developed which gives accurate color reproduction with high speed.

Any color can be reproduced accurately. Machine has two dials. One is to select the right colorant and the other the right amount. The right amount of each tinting agent is then dispensed. The resulting color mix will match perfectly the chip in the custom color reference.

Paint Marketing Department, W. P. Fuller & Co., Dept. PVP, 301 Mission St., San Francisco, Calif.

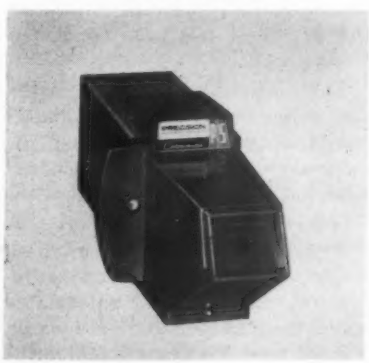
COLORIMETER

Color Valves—Wide Variety

"Precision ASTM" colorimeter has been developed.

Said to be designed to fully comply with ASTM D1500 method of test for measuring color of petroleum products, for specifying standards in fundamental terms and for obtaining substantially improved chromaticity.

PRECISION



Said to considerably improve method for obtaining color values in wide variety of lubricating and heating oils, diesel fuel oils and petroleum waxes in 16 color standards.

Precision Scientific Co., Dept. PVP, 3737 West Cortland, Chicago, Ill.

COLORIMETER

Reproducible Measurements

ASTM color scale reported to have 16 uniformly spaced, precisely defined color intervals for matching oil samples.

Color of each step is specified according to the "chromaticity" coordinates established by the International Commission on Illumination. New ASTM colors said to be based on spectrophotometric analysis of a wide variety of petroleum products, made by the Bureau of Standards.

FISHER

Color glasses supplied with every colorimeter reported now identical, within ± 0.006 chromaticity.

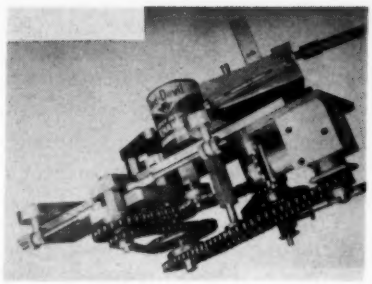
Colorimeter uses 115-volt, 50 or 60 cycle a-c or 115-volt d-c.

Fisher Scientific Co., Dept. PVP, 384 Fisher Bldg., Pittsburgh 19, Pa.

CONTAINER PRINTER-CODER

Automatic Operation

New container printer-coder for paint cans introduced. Designed for completely automatic operation, and for attachment to filling equipment, the marker utilizes flexographic printing.



INDUSTRIAL MARKING

Adjustable through full range of sizes from 3″ to 6″ diameters. Simple hand wheel adjusts printing head for can sizes and circumferences. Motivation power taken from the filling unit.

Claimed speeds can be obtained at 60 per minute and higher.

Inking system is vertical, external pump type, without valves or pipes, and uses a quick drying aniline ink.

Interchangeable rubber printing dies molded in one continuous length for marking one-gallon containers. Duplication and over printing on smaller sizes prevented.

Industrial Marking Equipment Co., Inc., Dept. PVP, 454 Baltic St., Brooklyn 17, N. Y.

CONTAINER STAPLER

Rapid Performance

Giant Container Stapler—Model G—closes 1100 lb. test triple wall or double wall boxes for as little as one cent.

Model G (Giant) delivers over half a ton of pressure with each stroke-that's stapling to stay. This power tool "sets-up" the bottoms of empty triple wall or double wall boxes just as cheaply as it closes the tops.

It drives staples with big, long legs. Only a few Giant Economy size staples are required to "set-up" or close the top of any average size triple wall or double wall box. Staple leg lengths: 7/8″—1″—1-1/8″—1-1/4″—1-3/8″.

Automatic double acting pneumatic piston said to guarantee rapid performance—rugged endurance.

Furnished complete with lubricator and air filter. Automatic water trap eliminates production down-time for trap drainage.

Container Stapling Corp., Dept. PVP, 308 N. Park Ave., Herrin, Ill.

CONVEYOR ROLLER
For Package and Carton Handling

Lightweight conveyor roller for package and carton handling.

Economical #138 roller features "spring-o-matic" axle construction which is said to permit quick, easy insertion or removal of the roller from the frame.

For positioning roller in conveyor frame, shaft end is manually depressed; spring loaded, it snaps into the axle hole of the frame, ready for immediate operation.

Conveyor sections available in 12" and 18" widths from stock and other widths from 6" to 30" on special order. Roller itself, which turns on integral ball bearing, is 1-3/8" in diameter, with 18 gauge steel wall, and is rated at 80 lbs. capacity.

Roller spacing for #138 available in multiples of 1½". Rollers available for use with both straight and curved conveyor sections.

E. W. Buschman Co., Dept. PVP, Clifton and Spring Grove Avenues, Cincinnati 32, Ohio.

COUNTER-ROTATING PUMP
For "Problem" Materials

Counter-rotating pump designed to handle "problem" materials.

It handles chemical slurries, sand and water and viscous materials in a wide range of densities, with solid particles in suspension, at very low and very high temperatures and, at high flow rates and pressures, without separation of the mixtures.

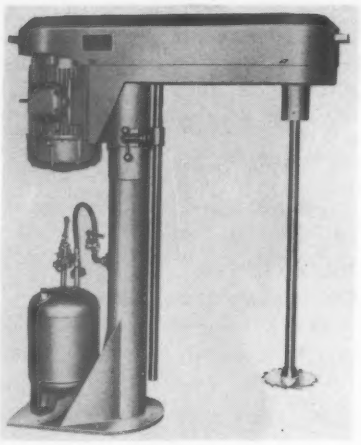
Pump operates by the method of counter-rotation supplied by two small diameter impellers. These axial impellers, counter rotating at relatively high velocities, allow the free passage of coarse and viscous materials.

Pump is of simple design with open clearance throughout. No sealing or wearing rings are required.

Baez Counter-Rotating Pump Corp., Dept. PVP, Six Manhasset Ave., Port Washington, L.I., New York.

COWLES DISSOLVER
Up To 15 H. P.

High speed dissolver for mixing



MOREHOUSE-COWLES

batches of from 50 to 200 gallons. The unit, model 510-VH, requires only 7 sq. ft. of floor space, yet enables the application of 7½, 10, or 15 H.P.

Equipment has wide application in ultimate dispersion, dissolving, emulsifying, and deagglomerating in processing solid-liquid, liquid-liquid, or gas-liquid materials of up to 50,000 centipoises.

While in operation, the assembly can be raised by hydraulic lift. Minimum height is 69½", maximum 111½", a rise of 42". The impeller will center in a tank up to 48" in diameter.

Shaft speeds of 890, 1135, 1509, 1750, and 2040 r.p.m. can be quickly attained by use of interchangeable sheaves on the V-belt drive.

Bridge constructed to swing in a 180° arc and may be locked in any lateral position or height. Entire unit, without motor, weights approximately 700 lbs.

Morehouse-Cowles, Inc., Dept. PVP, 1150 San Fernando Road, Los Angeles 65, California.

D

DEAMIDATED ZEIN
Dispersed in Water

Zein G210 does not require strong alkali or organic solvents to disperse it in water.

This new Zein produces hard, tough, grease resistant films that are non-thermoplastic. It can be used to formulate rubless floor polishes and other products.

Compatible in all proportions with shellac, bleached or bleached dewaxed, and with phenolic modified rosin esters.

Corn Products Sales Co., Dept. PVP, 17 Battery Place, New York 4, N. Y.

DEFOAMER
All-purpose Compound

Defoamer 711 now available. Claimed to be an all-purpose antifoam compound, suitable for use in either water or solvent systems.

Defoamer said to contain no silicones, will not separate out and no agitation is required to maintain it at peak efficiency. It has good compatibility, and is stable and active in acid, alkaline or hard-water media. Also non ionic and unaffected by temperature changes.

Isochem Corp., Dept. PVP, 221 Oak St., Providence 9, R. I.

DEFOAMING COMPOUND
For PVAc Formulations

A 100% active liquid defoaming compound for vinyl acetate formulations.

Foamtrol #103 said to be an efficient and inexpensive means of eliminating foam during the manufacturing and application of vinyl acetate based paints and coatings. In most applications a concentration of 0.1% by weight is sufficient to handle the average foam problem.

Foamtrol #103 is also claimed to eliminate foam build up in emulsion and suspension polymerization of polyvinyl acetate, polyvinyl chloride, acrylics and many other reactions. Literature and samples available on request.

Arlen Chemical Corp., Dept. PVP, 338 Wilson Ave., Newark 5, N. J.

DIGLYCOL LAURATE
Emulsifier and Anti-foamer

"Sole-Onic CDS," diglycol laurate self-emulsifying type emulsifier and defoamer, has been placed on the market.

The oil-soluble surfactant is for use as emulsifier in water based paints, pigment dispersions, industrial oil products and polishes. Also for use as defoamer in water based paints.

Product is soluble in ethanol, isopropanol, toluol, benzene, mineral oil, naphtha and chlorinated solvents. Dispersible in water. Partially soluble in methanol, ethyl

acetate, acetone and saturated aliphatic hydrocarbons.

Sole Chemical Corp., Dept. PVP, 27 E. Monroe St., Chicago 3, Ill.

DENSITOMETER
Photometric Applications

New QuantaLog, now available, has following features:

Direct reading 0 to 4.0 density units. (Meter has optical density scale printed in black and the Transmission and Reflectance scale printed in red to avoid confusion.)

The QuantaLog has an accuracy of ± .02 density units over the entire scale, when being used with either the transmission attachment or reflection head attachment. Because the unit uses a low input (only 25 watts) it has no "heating up" problem.

It has a full scale sensitivity of 4.0 density with an excitation of only .01 microlumens at 2850°K.

At present two attachments are in production, a reflection head attachment and a transmission attachment, and it is expected that a digital readout attachment will be offered in a very short time. The basic unit and attachments are finished in attractive two-tone gray with a satin chrome and contrasting ebony black nameplate.

The basic QuantaLog Photometer is designed to sell for under $400 and the reflection head or transmission attachment for about $200.

Macbeth Corp., Dept. PVP, P. O. Box 950, Newburgh, N. Y.

DISPERSION MILL
Continuous Operations

PUC multistage dispersion mill, said to offer improved method for wet milling and grinding, homogenizing, dispersing, emulsifying and extracting has been introduced.

Mill serves as its own pump and operates either on a continuous through-put basis or for batch operations.

Mill claimed to produce coatings with maximum particle size reduction and optimum dispersion, handles solids concentration up to 70 per cent and effects the maximum dispersion of gums and resins into vehicles.

The Pfaudler Co., Dept. PVP, 1000 West Ave., Rochester, N. Y.

PFAUDLER

DITHIOL
Cross-Linking Agent

Inexpensive dithiol, glycol demercaptoacetate has been introduced.

Can act as a cross-linking agent and monomer for special polymerizations by addition across ethylenic unsaturation, and by reaction with active halogen.

Evans Chemetics, Inc., Dept. PVP, 250 E. 43rd St., New York, N. Y.

DRUM AGITATOR
For Hazardous Atmospheres

New line of air-driven drum agitators, said to be completely safe, now available.

Designed for use in hazardous atmospheres where explosive mixtures are used.

Units are portable and can be used on standard 55-gallon drums when agitation of explosive liquids prohibit use of electrical equipment. Can be operated off most existing compressed air systems.

Two motor sizes available to meet wide range of mixing requirements. Mixing speeds vary from 500 to 2000 rpm, depending on air pressure.

Prenco Products Inc., Dept. PVP, 507 East 10 Mile Road, Hazel Park, Mich.

DRUM CRADLES
With or Without Casters

Grizzly drum cradles for 55 and 30 gallon and smaller drums.

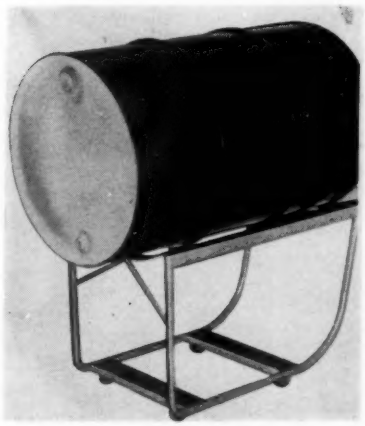
All welded, tubular frames and channel braces give cradles added strength. Designed for rugged use, all edges rounded and smooth.

Available without and without casters, with and without drum rollers.

If requested, cradles are furnished with two swivel and two rigid casters to enable easy and quick placement to exact location for instant use. Rollers are for revolving drums for mixing, and draining alignment.

Cradles are 30 inches high, 18½ inches wide with various heights of 19, 25, 26½, and 27½ inches. Shipping weight is 30 to 40 pounds.

Pucel Enterprises, Inc., Dept. PVP, 3746 Kelley Avenue, Cleveland 14, Ohio.

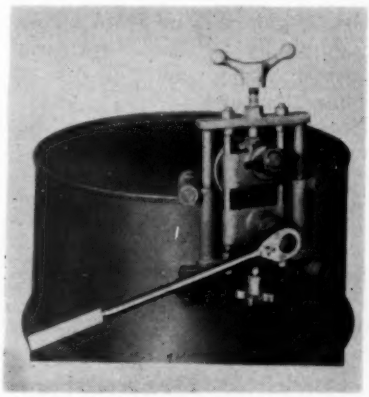


PUCEL

DRUM DE-HEADER
Smooths Cut Edges

A portable drum de-header has been made available which shears down through the head against inside body of either full or empty

GILCO



drums while smoothing cut edges of metal against body of drum.

De-heads drums from 14 to 28½ inches in diameter, with chimes ranging from one-quarter to 1½ inches in depth, and of 16 gauge steel and thinner.

Instrument said to be sturdily constructed with hardened tool-steel four-inch shear and traveler. L.M. Gilbert Co., Dept. PVP, 420 Bourse Bldg., Fifth & Ludlow Sts., Philadelphia 6, Pa.

DRUM HANDLER
One Man Operation

Upright lifting and transporting of open top drums, strain-free handling of 1,000-pound drums, raising drums to drain stands or placing on scales may be accomplished by one man using CeCOR Model 66H drum handler.

COOLANT

Easy-to-operate hydraulic lift raises loaded drum. Operator does not touch drum or bear weight. Useful for weighing drums of solvents or paints. Maximum lift with 55-gallon drum is 16 inches. Clamp fully adjustable for variations in drum height as well as chime thickness.

Mounted on two 12-inch diameter oil-resistant, rubber tire, roller bearing wheels and one eight-inch diameter oil resistant, rubber tire, ball bearing caster.

Coolant Equipment Corp., Dept. PVP, Verona, Wis.

DRUM LIFTER
One-Man Operation

Grizzly No. 235 Drum Lifter

PUCEL

lifts vertically. Has 2,000 lb. capacity—attached and removed in seconds, used with fork trucks, chain falls, cranes and hoists. Moves 55 and 30 gallon and even smaller drums.

Tiers and handles drums in and out of close quarters. Weighs 26 lbs.

Pucel Enterprises, Inc., Dept. PVP, 3746 Kelley Ave., Cleveland 14, Ohio.

DUMP BUCKET SCOOPS
Bulk Handling

Hydraulic and mechanical dump bucket scoops for bulk handling of chemicals and other materials are now offered.

Hydraulic dump bucket scoop, available in either 5 or 10 cubic foot capacities, is operated from controls right in the driving compartment. Has maximum upward tilt of 30° and downward tilt of 45°.

Mechanical dump bucket scoop, offered in the same cubic foot capacities, has upward tilt of 10° and downward of 45°. Release mechanism is included on the scoop which automatically locks it in the loading position when surface is contacted.

Scoops come in different models. Model "E" available in capacities to 4000 pounds.

Lewis-Shepard Products, Inc., Dept. R8-3, Dept. PVP, 125 Walnut St., Watertown 72, Mass.

E

ELECTRIC MOTOR
Single-Voltage Submersible

Submersible a-c. electric motor for direct coupling to pumps which must operate continuously while submerged in oil, water or liquid chemicals.

The polyphase, single-voltage motor available in sizes from ¾ through 15 horsepower.

Special universal mounting flange designed for direct connection to most standards pumps and modifications can be made.

Rated at 55°C. temperature rise for 30-minute duty in 40°C. air, and for continuous duty in 40°C. liquid, pressure-proof motor is oil-filled to give top performance when immersed at any depth.

Reliance Electric & Engineering Co., Dept. PVP, 24701 Euclid Ave., Cleveland 17, Ohio.

RELIANCE

ELECTRIC PALLET TRUCK
Operates in Narrow Aisles

Powerox electric pallet low-lift model PXG truck available.

Compact drive mechanism with motor and transmission placed directly above the drive wheel reduces overall length and allows truck to operate in six foot aisles with 48x48 inch pallet loads. Load stop to extreme front end measures only 24½ inches.

Power lifting and lowering by pushbuttons located on rear of handle gives positive control over retraction and extension of the rear wheels.

Hydraulic unit has motor, pump, overload relief valve, and reservoir in a single package unit.

"Flying saucer" pallet entry discs on fork ends give the effect of three added inches of roller diameter to help skim forks into pallet with ease.

A thumb-touch butterfly type control on the handle gives two speeds forward and reverse. Total lift is four inches.

Models are available in 4000 and 5000 pounds capacity.

Barrett-Cravens Co., Dept. PVP, 628 Dundee Rd., Northbrook, Ill.

BARRETT

ELECTRIC TIERING TRUCK
24-Volt Rider-Type

Rider-type narrow-aisle electric tiering truck incorporating a 24-volt electrical system.

Designated as the L-S 24-volt Model "MN" truck. Travelling speeds of 4.5 m.p.h. empty, up to 4.2 m.p.h. loaded. Lifting speeds as much as 50 f.p.m. empty, 42 f.p.m. loaded.

Truck is a straddle-type vehicle with standard forks. Offered in capacities of 2000 or 3000 pounds.

Four speeds in both forward and reverse directions, as well as three separate braking systems.

Lewis-Shepard Products, Inc., Dept. R8-17, Dept. PVP, 125 Walnut St., Watertown 72, Mass.

EMULSIFIER
Water in Oil Type

Water-in-oil emulsifier able to form unusual thermostable emulsions has been announced.

Product has had wide use in Europe, where it has been developed. Called Emocithin, it is a semisolid containing neither inorganic nor toxic substances, and is easily incorporated into oils, fats and waxes by simple warming and blending techniques.

Ability to form fine dispersions said to make Emocithin ideal for dispersing pigments. Counteracts pigment settling. Product produces emulsions which are said not to separate at temperatures up to 200°F. Emulsions said to be pure, tasteless and odorless.

Morningstar, Nicol, Inc., Dept. PvP, 630 W. 51st St., New York, N. Y.

EPOXY CO-REACTANTS
For 100% Coatings

Two new liquid co-reactants for epoxy resins, trade-named Genamid 250 and Genamid 310.

Particularly suitable in the field of 100% solids coatings.

Key properties are low viscosity and fast cure. Genamid 250 is more fluid and cures more rapidly than the 310.

Expected to find wide usage in coatings, castings and adhesives.

Chemical Division, General Mills, Dept. PVP, Kankakee, Ill.

ETHOXYLATED AMINES
Water-Soluble

New series of quaternized ethoxylated amines trade marked Ethoquads.

Ethoquads are water soluble, cationic surface active agents with properties combining those of quaternary ammonium chlorides and ethoxylated fatty amines.

Initial laboratory evaluation indicates they will be used as more effective wetting agents, emulsifiers, dispersing and solubilizing agents, and as softening and antistatic agents.

Armour & Co., Chemical Division, Dept. PVP, 1355 W. 31st St., Chicago 9, Ill.

EXPRESS ROLLER
To Move Processing Components

Express Roller offered for storing and transporting heavy, cumbersome or bulky chemical processing equipment in weight ranges from two to 300 tons.

INDUSTRIAL EAST

Versatile unit (in sets of fours) that work on principle of caterpillar-action.

Units comprise a series of moving rollers locked in endless track which extend above and below a heavy steel frame. Rollers can be moved on small radii in aisles or machinery bays. No screech or grab occurs from straight compression force up to 150 tons.

Industrial East Co., Materials Handling Division, Dept. PVP, Clifton, N. J.

EXTINGUISHER
Pressurized Dry Chemical

Dry chemical powder has been combined with fast action of pressurized squeeze-lever construction in two new sturdily-constructed, high-capacity extinguishers.

Models, containing 20 and 30 pounds of non-toxic and non-freezing powder.

FYR-FYTER

Fanning out in a 60° arc from discharge nozzle, powder travels 15 to 20 feet to the fire source. It absorbs heat, and turns into a fire-killing gas.

Operating pressure of 150 p.s.i. can be maintained for long periods.

Fyr-Fyter Co, Dept. PVP, 221 Crane St., Dayton 3, Ohio.

F

FATTY AMINES
In Commercial Quantities

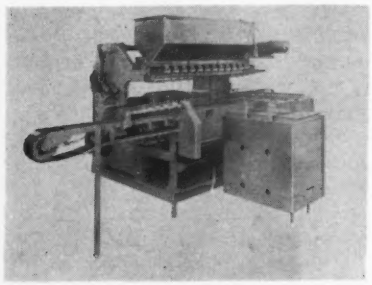
Additions have been announced for a line of fatty nitrogen derivatives. Eleven products are available in commercial quantities.

Products include seven primary

fatty amines trademarked Alamines, three fatty quarternary ammonium chlorides called Aliquats and a trimethylene diamine named Diam.

Primary amines are available in technical and distilled grades. They include lauryl, palmityl, cottonseed and soya fatty amines. Fatty trimethyl ammonium chlorides are derived from high purity lauryl, palmityl and coco primary amines, while Diam has a coco fatty amine base.

General Mills Chemical Division, Dept. PVP, Kankakee, Ill.



FILLER

FILLING MACHINE
15 Minute Change-Over

Filling machine said to permit operator to make change-overs to different size containers in 15 minutes or less has been made available.

Machine, called Model SL-58, said to handle semi-liquid and semi-solid products and fills up to 250 containers per minute by bottom-up or clean cut-off filling method.

Spring lift rising table set to correct height by adjusting screw. Simplified "no jar—no fill" device, which keeps the filling mechanism from operating when there are no containers at point of fill, requires no adjustment during change-over. Containers indexed through machine by combination walking beam and pin-type push bars.

Filler Machine Co., Inc., Dept. PVP, 10 Penn Ave., Rockledge, Philadelphia 11, Pa.

FILM APPLICATOR
8 Different Readings

Wet paint film applicator which gives eight different readings off a single instrument is available in two models.

The "Precision Model *#1* Wet Paint Film Applicator," which is used in conjunction with "Hiding Power" charts, will lay down a film 2" wide in any of eight thicknesses from .001" to .008" in increments of .001".

The Model #2 will lay down a 2" wide film in any of eight thicknesses from 5 to 50 Mils as follows: 5, 10, 15, 20, 25, 30, 40, and 50. This model can be used for checking latex films for toughness and flexibility.

Applicator is square in design and has four separate paths on each side. There are no adjustments to make on the device. A few drops of the material to be checked are placed on the inside of the hollow square near the correct opening for the thickness required. Applicator is then drawn down over the chart and a uniform thickness of film is presented for observation and test.

PRECISION

Made of a fine steel, glass-hardened, and treated to prevent rusting. It is priced approximately the same as the conventional applicator from which only one reading can be obtained.

Precision Gage & Tool Co., Dept. PVP, 320 E. Third St., Dayton 2, Ohio.

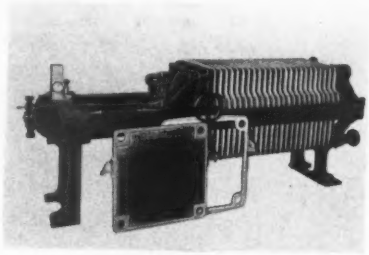
FILTER PLATES
Fiberglas-Reinforced Polyester

Filter press with polyester filter plates, now available.

New type of plate is made of fiberglas-reinforced polyester. Can be molded in any required size. Remains dimensionally stable throughout a wide range of temperatures.

Plate is said to be as strong as one made of aluminum, weighs less than one-third that of cast iron, and costs one-third of stainless steel.

T. Shriver & Co., Inc. Dept. PVP, 808 Hamilton St., Harrison, N. J.



SHRIVER

FIRE EXTINGUISHER
Dry Chemical Type

Dry chemical powder for fighting flammable liquid and electrical fires has been made available in a 2½-pound pressurized extinguisher.

Portable extinguisher is recommended for on-the-spot protection against incipient fires in gas, oil, paint, propane, chemicals and electrical equipment. Accompanying bracket may be mounted near potential hazard areas.

Rubber valve assembly said to be leakproof. Quick and simple recharging also claimed. Depression of lever spreads 60-degree-wide-angle blanket of non-freeze, non-toxic, non-conducting dry chemical powder to range of 12 feet.

The Fyr-Fyter Co., Dept. PVP, 221 Crane St., Dayton 3, Ohio.

FIRE HOSE
Light Weight

Light weight, flexible fire hose has been designed for use in chemical industry.

Hose has guaranteed test pressure of 400 pounds. Constructed of Neoprene cover and tube with Dacron filler and cotton warp. Recommended for use where contaminated water is likely to be encountered during a fire.

Goodyear Tire & Rubber Co., Dept. PVP, Akron 16, Ohio.

FLASH PT. DETERMINATION
Range of 80° to 180°F

Automatic means for rapid and accurate indication and recording of flush points with range of 80° to 180° F. has been developed.

Of particular interest where quick and permanent ASTM D 56 flush points and operational simplicity

are required. Results said not to vary more than two degrees F. from those obtained manually under ASTM D 56, "Flash Point by Tag Closed Cup Tester," provisions.

Accuracies within ± one degree F. obtained in two to four minutes, depending upon flash point. Precision Scientific Co., Dept. PVP, 3737 W. Cortland St., Chicago 47, Ill.

PRECISION

FLOOR WAX HARDNER
Eliminates Tackiness

Main weakness of acrylics as used in standard floor waxes said to bo overcome by a new hardner.

The hardner is known as Shanco L1135, and it is contended that acrylics are made harder, with a water white color and extreme brilliance, when laid down from emulsions containing L1135.

The physical characteristics of this resin are given as M.P. (cap) 155°-165°C., (R&B) 176°-184°C. The acid number 130-140. L1135 dissolves in water at 190°-195°C. with 15-20% ammonia.

Shanco Plastics & Chemicals Inc., Dept PVP, Tonawanda, N.Y.

FLUORESCENT PIGMENTS
High Conspicuity

Eight high conspicuity bold fluorescent pigments for use in formulating all types of industrial safety, traffic and municipal, aircraft, marine and specialty paint lines.

These pigments: Pink, red-orange, green, yellow orange, red, lemon yellow, cerise red, and gold yellow can be toned by careful addition of non-fluorescent material to produce a wide variety of extremely brilliant, high visibility colors.

Supplied only in 100% pure form, these bold pigments are effective in brightening up non-fluorescent colors. Used in strictly fluorescent. paint formulations, these colors claimed to last indefinitely indoors and will fade only gradually outdoors. The pigments are compatible with most vehicles and will take small amounts of transparent extenders.

Lawter Chemicals, Inc., Dept. PVP, 3550 Touhy Ave., Chicago 45, Ill.

FLUSHED COLORS
For Water-Emulsion Paint

New line of flushed colors for use with water-emulsion paints has been introduced.

Known as Seatone, the line consists of 12 organic and inorganic pigment water dispersions for producing water-emulsion finishes for all industrial and architectural applications. The new group said to provide every pigment required for complete color formulating.

An outstanding characteristic of the Seatones, it is pointed out, is the fact that each pigment particle remains in its original precipitated state. Other advantages cited are high tinting strength and the ability to produce clean colors.

The new line of flushed colors is compatible with polyvinyl acetate, acrylic, and styrene-butadiene water emulsion systems.

Hilton-Davis Chemical Co., Dept. PVP, 2235 Langdon Farm Rd., Cincinnati 12, Ohio.

FORK TRUCK
Multi-Purpose Attachment

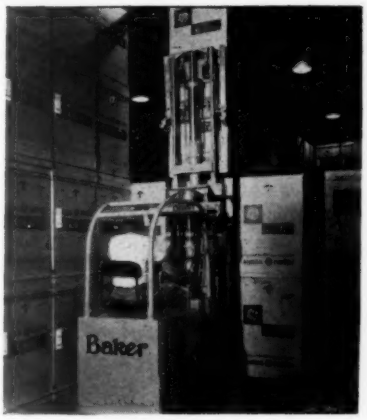
Fork truck now comes equipped with Multi-Handling attachment designed to economically handle odd and varied-sized cartons in small quantities without time-consuming changing of attachments.

Developed for use in warehouse distribution centers and manufacturing operations. Attachment includes side shifter, lift extender, carton lip, finger lift and pair of hinged forks. Equipment handles ordinary pallet loads, hauls and stacks large cartons, handles extremely high loads and removes highly-stacked heavy loads by unique hinged fork method.

Equipment said to eliminate binding strap breakage because of normal carton lip distortion. Loads and unloads highway trucks or boxcars.

Multi-Handling Attachment is mounted on 2,000-pound chassis with 1,000 pound capacity. Has 24-inch load center, stacks as high as 248 inches.

Baker-Raulang Co., Dept. PVP, 1250 W. 80th St., Cleveland 2, Ohio.



BAKER-RAULANG

FORK TRUCKS
Electric Powered

EC-20 electric model having a 2000 lb. capacity is now available.

Performance advantage of machine said to stem from use of new type of "carton pile" drive control which provides constantly smooth acceleration and permits full control of "inching" during delicate stacking operations.

CLARK

Features include easier steering and positive tractive power. Directional control lever and lift-tilt lever within finger-reach of the

operator. Model will climb ten per cent grade with full load.

Claimed to travel up to 6.5 mph both forward and reverse. Has lift speed, loaded, of 50 feet per minute, and a turning radius of 62 inches.

Industrial Truck Division, Clark Equipment Co., Dept. PVP, Battle Creek, Mich.

FURNACE

For Heating Micro Samples

Micro Combustion Furnace operates over temperature range of 150 to 1130°C. Single unit can be used in determination of carbon, hydrogen, nitrogen, sulfur, fluorides and oxygen.

Heating element, of one-piece Nichrome V wire, is special helix-wound coil designed to eliminate hot center and cold ends. Manufacturer says there is virtually no temperature variation along entire length of tube.

Furnace can be heated to 1125°C. in less than ten minutes, and cooled to room temperature in about same time, according to manufacturer. Thermocouple indicates temperature within combustion tube. All common combustion tubes up to 12mm in diameter are accommodated.

Furnace dimensions are 14 inches long, 9¼ inches wide and 6½ inches high. Casing adjustable from 9¼ to 10¾ inches for easy positioning of unit in a combustion train.

Fisher Scientific Co., Dept. PVP, 384 Fisher Bldg., Pittsburg 19, Pa.

G

GAS MIXER

Dual-Port Mixing Valve

Proportion-Aire, available in standard sizes with rated maximum capacities from 500 cfh to 75,000 cfh at pressures up to 100 psi.

For mixing two or more gases at a preset ratio despite variations in mixture pressure and total flow.

Consists of a dual port mixing valve and either an integral vane-type positive displacement pump or centrifugal compressor. Valve so designed that the total port area varies in response to changes in pressure-drop across the valve,

SELAS

but the ratio of individual port areas, once set, remains constant.

Mixture ratios may be held to within 2% on manual setting and to within 0.2% with appropriate automatic control, at varying demand from 10% to 100% of rated capacity.

Proportion-Aire cannot be used with halogens or other highly corrosive gases.

Selas Corp. of America, Dept. PVP, Dresher, Pa.

GAS SCRUBBING SYSTEMS

Two Types

ARco "Jet" (wet type) gas scrubbing systems have been developed and placed on the market

Scrubbers are available in two types of design: Cyclonic type handles dust and liquid aerosols which are micron in size or larger, and Impactor type (agglomerator) handles fumes, fogs and mists which are submicron is size

Typical use in chemical plants includes sulphuric acid mists and phosphoric acid mists. Both units are operated on water or other recycle solutions piped into spray jet headers located on main body of scrubber.

Process Equipment Division, Automotive Rubber Co., Inc., Dept. PVP, 55 W. 42nd St., New York 36, N. Y.

GAS THERMATRON

Measures Gas Concentration

The concentration of one gas in a multi-component mixture can be measured selectively and continuously with a newly developed instrument, the M-S-A Gas Thermatron.

The instrument enables accurate gas analysis without chemical or physical changes of the gas mixture. It provides an improved means of utilizing the thermal conductivity principle of measurement with additional convection cells which take into account differences in convective heat losses from hot filaments through gases. Since convective heat loss varies with both molecular weight of gases and diameter of cells, convection cells of different diameter are provided in order to take advantage of the optimum thermal convection loss of each gas.

There are four cells with hot filaments in the M-S-A Gas Thermatron—two conduction cells of small diameter and two convection cells of selected large diameter. The filaments of these cells are the arms of a Wheatstone bridge circuit arranged with two parallel branches comprising one small filament cell and one large filament cell in series, and annulling resistors.

The instrument can be calibrated for any gas over either narrow (0-1%) or wide (0-100%) ranges of gas concentration. Accuracy is within 2 percent of full scale throughout the selected range.

Applications include process control, control of atmospheres and combustion, determination of gas purity, and many others. Typical examples are measurement of carbon dioxide in flue or exhaust gases, measurement of ethylene oxide in mixtures of carbon dioxide and air, and in mixtures of hydrogen, carbon dioxide, and air; measurement of hydrogen in furnace atmospheres, and measurement of hydrogen, carbon monoxide, and methane in mixtures of these three gases with air or nitrogen. Each instrument is designed for its specific application.

M-S-A Thermatrons draw 100 watts. Sample requirement is 100 to 1000 cc per minute. No pump is required. The instrument can be compensated for water vapor or, if desired, it can be measured. Speed of response is 60 seconds for 90 percent of full scale. Calibration is linear for most applications and is stable. Zero drift over a 30-day period is negligible.

Mine Safety Appliance Company Dept. PVP, Pittsburgh, Pa.

GAS-VAPOR CHROMATOGRAPHY
Wider Application

New research model Kromo-Tog for the application of gas and vapor chromatography to wider areas.

With new model K-5 Kromo-Tag, it will be possible to analyze materials that boil up to 475°C. and higher, including fatty acids.

Model available either with one or two complete systems and the two system instrument may have have either one or two recorders.

Two system model has separate columns, detectors, controls and fraction collectors for simultaneous

BURRELL

analysis of two separate samples.

Detectors are extremely sensitive. Other features include independent temperature control of both columns and detectors, rapid heating and cooling, proportioning heat control and specially designed glass or metal columns. Maximum power consumption is 3500 watts.

Burrell Corp., Dept. PVP, 2223 Fifth Ave., Pittsburgh 19, Pa.

GEAR DRIVE
Up to 4,000 Gallon Vessel

Low maintenance gear drive with a solidly silent operation. Intended for use on 300 gallon through 4,000 gallon agitated vessels.

The unit, designated the B H Drive, offers various design advances. These are pilot fit, interchangeable seal or stuffing box, wide bearing span, hardened and lapped spiral bevel gears, five leak proof oil seals, and new "T" head draw bar design.

The B H Drive is currently rated at 12, 30 and 60 hp units at 100 r.p.m.

The Pfaudler Co., Dept. PVP, 1065 West Ave., Rochester, N. Y.

H

HAND CLEANER
Deep Antiseptic

New Vibra-Clean waterless hand cleaner claimed to safely remove paint and varnish from exposed skin area.

Also said to deodorize. Easy to apply. Contains Actamer and lanolin.

Hanlon Chemical Co., Inc., Dept. PVP, 1016 S. Coy, Kansas City 5, Kansas.

HAND LIFT TRUCK
Light Weight And Sturdy

Multiple stroke, 250 pound truck with 48" platform, designed to speed the lifting and handling of skid loads up to 2500 pounds.

HD hydraulic hand lift model has all-welded, ribbed, aircraft type construction frame said to give unusual strength and stability.

Fast operating foot lift pedal conveniently located. Ten strokes give a full 4½" lift. Wheelbase is 8-11/16" from platform stop to centerline of front wheels.

Hydraulic lift pump and ram

BARRETT-CRAVENS

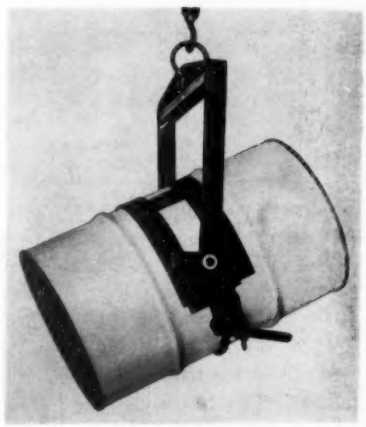
housed as compact single-package unit, vertically mounted assuring minimum friction. Slow or rapid load descent can be easily adjusted for.

HD models have lowered heights 6,7,9,11 inches. Various platform lengths and widths available.

Barrett-Cravens Co., Dept. PVP, 628 Dundee Rd., Northbrook, Ill.

HANDLING EQUIPMENT
For Drums

Drum-Karrier to provide dependable method of moving 30-gallon drums via monorail or crane.



MORSE

The Karrier, it is claimed, will allow the worker to easily hook it to monorail hoist, crane or chain block, to snap its saddle between barrel chines, to cinch tightly and then to transport, tilt, mix or dispense contents over a receiving tank.

Positive tilt locks hold drum in vertical position during travel and permits easy controlled pouring.

Morse Manufacturing Co., Inc., Dept. PVP, 727 West Manlius St., East Syracuse, N. Y.

HARDWOOD PALLETS
Three Standard Types

Three standard types of hardwood pallets for handling unitized carload and truckload shipments of carbon blacks in bags have been made available.

Expected to meet most conditions in shipping and handling where unit paper board pads are not suitable.

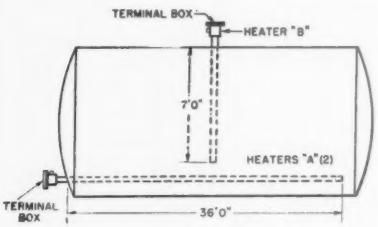
Columbian Carbon Co., Dept.

PVP, 380 Madison Ave., New York 17, N.Y.

HEATING SYSTEM
For Phthalic Anhydride

System of heating by electricity has been developed for manufacturers and users of phthalic anhydrides.

Heating elements enclosed in three-inch diameter stainless steel pipes designed to give watt density of two watts per square inch of heating surface. Supplies required heat without subjecting material to high heater surface tempera-



TURBINE

tures which discolor phthalic anhydride above 302° F. during prolonged heating.

Stainless steel tank holds 12,000 gallons. Two heating tubes supply total of 15 KW at 230 volts, three phase, 60 cycles. Heating elements may be withdrawn for inspection, repair or replacement without affecting contents of tank.

Hynes Electric Heating Div., Turbine Equipment Co., Dept. PVP, Mountainside, N. J.

HOPPER FEEDER
For Transfer Applications

New air-operated, high-suction hopper feeders available. Said to offer simple and inexpensive means for transferring fluid materials, either wet or dry, from bulk bins or shipping containers, into all types of processing machinery or vice versa.

Provided with a newly developed discharge valve that closes automatically when unit is in operation.

Operates entirely on compressed air and has no moving parts in suction unit.

Materials do not mix with high pressure air. Units equipped with internal filters for fine materials and can be cleaned without being removed.

VAC-U-MAX

Vac-u-Max, Dept. PVP, 1 Montgomery St., Belleville 9, N. J.

HYDRAULIC DRUM LIFT
For Controlled Pouring

Hydraulic drum lift equipped with mechanical arrangement for ease and safety in pouring drum contents is now being marketed.

Gear reducer control device is completely enclosed and said to assure self-locking and absolute control at any pouring angle. Said to be especially advantageous where contents of half-empty drums must be carefully poured.

Unit basically designed to handle 55-gallon drums, can be adapted to handle other sizes in steel or fibre drums on special order. Lifting capacity is 750 pounds, drums can be raised to 70 inches by foot-actuated hydraulic jack.

Unit is constructed of square steel tube, mounted on six-inch

STERLING FLEISCHMAN

oil, gas and spark-proof wheels. Length is 49″ height is 56½″ and width is 38″.

Sterling Fleischman Co., Dept. PVP, P.O. Box 94, Broomall 1, Pa.

L

LAB CENTRIFUGE
Automatic Rotor Balancing

Automatic centrifuge, type SS-3, gives large-capacity, superspeed performance.

Has gyro-action self-centering drive which permits automatic rotor balancing to a degree said to be unequaled in the superspeed ranges.

Acceleration and braking are automatically controlled. Operating intervals established by a synchronous, motor-driven timer.

When centrifugal forces of more than 34,000 x G are required, there is the SS-34 rotor, having eight numbered compartments for 50 ml tubes, and capable of speeds in excess of 17,000 rpm.

SORVALL

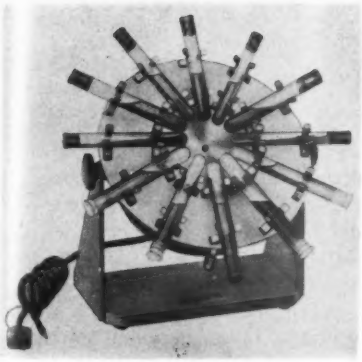
The SS-34 rotor may be adapted for the "Szent-Gyorgyi & Blum" 8-tube continuous flow system.

Ivan Sorvall, Inc., Dept. PVP, Norwalk, Conn.

LABORATORY AGITATOR
Four Rotating Speeds

Newly designed rotary liquid agitation laboratory apparatus now avilable.

Operating electrically, Model ST Spinnerette eliminates need for manual shaking of test tubes or small vessels. Combines versatility of four rotating speeds with the advantage of a changing tilt angle



NEW BRUNSWICK

of platform to provide optimum variation in rate of mixing or agitation.

Consists of a stainless steel oval enclosure in which are housed a synchronous motor and mechanical speed control mechanism. Mounted to motor assembly is an 11″ diameter aluminum platform which may be tilted from a vertical to horizontal position.

Rotating speeds of approximately 15, 30, 45, or 80 cycles per minute can be achieved.

Weighs 24 pounds. Dimensions are 12-3/8″ wide by 6″ deep by 13-7/8″ high.

New Brunswick Scientific Co., Dept. PVP, P.O. Box 606, New Brunswick, N.J.

LACQUER ADDITIVE
Eliminates Fish-Eyes

Additive for all lacquers and enamels eliminates fish-eyes and cratering in touch-up, panel repair, and complete refinish jobs.

Called Fish Eye Eliminator, it is a crystal clear material, packed in capsules. Each capsule contains a measured quantity sufficient for one pint of thinned paint.

Finishes Division, E.I. Du Pont de Nemours & Co., Dept. PVP, Wilmington, Del.

LACQUER SOLVENT
Miscible With Water

Poly-Solv EE acetate, a solvent for lacquers, now available.

Poly-Solvs are clear, almost odorless liquids, miscible with water and most organic solvents. Containing both an ether and an alcohol group, they are strong solvents for a variety of substances.

Organic Chemicals Department, Olin Mathieson, Dept. PVP, 745 Fifth Ave., New York, N. Y.

LEAD CHROMATE PIGMENT
For Anti-Corrosive Paints

Permox 143, basic lead silico chromate pigment, specifically designed for use in formulating anti-corrosive paints.

Particles consist of silica core enveloped in coating or shell of basic lead chromate.

Pigment said to have excellent tint retention and chalk resistance; and claimed to be ideal for all three coats—primary, intermediate, and finish coats.

Eagle-Picher Co., Dept. PVP, 900 American Building, Cincinnati 1, Ohio.

LEAD CHROMATE PIGMENT
For Metal Protective Paints

Pigment, "M50", consists of a silica core on the surface of which basic lead chromate has been fused.

Said to result in a pigment which has the proven rust-inhibitive properties of lead and chromium compounds and the weather-resistance of fused basic lead chromate.

Can be used in combination with other pigments. Colored and tinted paints containing "M50" said to possess unusually durable tint retention.

"M50" also claimed to be compatible with virtually all paint vehicles.

National Lead Co., Dept. PVP, 111 Broadway, New York 6, N.Y.

LIGHT-FADING TESTER
For Production Control

Research, testing and production control device for accelerating natural sunlight effects on coated and uncoated materials is now being offered.

Xenotest PL393 model tests for fading, photochemical changes and discoloration. Synthetic sunlight is produced by xenon lamp with suitable filters, which offers automatic operation including safety controls, and no continuous setting of carbon electrodes.

Lamp wattage is 1500, normal life is approximately 60 days. Two-by-four-inch specimens mounted on frames are rotated about the lamp. Frames may be rotated to simulate day-night sequence.

G. F. Bush Associates, Dept. PVP, Box 175, Princeton, N. J.

LIQUID EPOXY RESINS
Basic Resins Introduced

D.E.R. 332 said to possess characteristics previously unattained in the epoxy field.

Reported to be unique in that it is water clear, extremely uniform and has a very low viscosity.

Also introduced was D.E.R. 331, a standard unmodified resin suitable for customary use in tooling and casting.

D.E.R. 334, modified low viscosity resin, claimed to be especially suited for laminating.

Dow Chemical Co., Dept. PVP, Midland, Mich.

LIQUID PLASTICIZER
New Type

Technical grade of tributyl aconitate, a stable liquid plasticizer for vinyls, cellulosics and styrene copolymers, has been introduced in research quantities.

Early test results said to show product maintaining low-temperature flexibility in styrene-butadiene copolymers; and imparting improved heat and light stability to vinylidene chloride resins. Also said to be useful in plasticizing polyvinyl chloride, polyvinyl acetate, ethyl cellulose and other cellulose esters and ethers.

Commercial Development Division, Chas. Pfizer & Co., Inc., Dept. PVP, 630 Flushing Ave., Brooklyn 6, N. Y.

M

MACHINE LOAD CONTROL
Automatic Operation

Machine load control designed to protect machinery and equipment through automatic shut-off, automatic warning and/or continuous on-off automatic operation.

Said to be rugged, yet sensitive.

In its most comprehensive form, control is claimed to protect against overload, underload, no-load and phase failure (single phasing).

Engineered with two separate contact ammeters, each equipped with an indicating pointer, and activated by a current transformer

connected in one of the motor leads. Responsive to current, indicating pointers move identically across the two dials, monitoring and displaying continuously the load on the drive motor.

Each ammeter equipped with adjustable limit pointers. Said to actuate the warning and shut-off mechanisms.

Simpler forms of control engineered. Phase failure protection also available.

Tipptronic, Inc., Dept. PVP, Chagrin Falls, Ohio.

MATERIALS HANDLING
Explosion-Proof

New 54.00 Go-Getter said to be designed for use in explosion hazard areas.

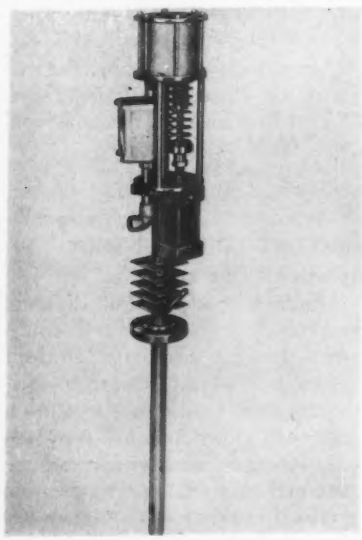
Threaded joints are utilized for safety not only in operation but for ease of maintenance to minimize errors in reassembly.

Revolvator Co., Dept. PVP, North Bergen, New Jersey.

MEASURING ELEMENTS
For High-Pressure Reactors

New measuring elements use a proximity switch for timing the fall of a piston through the liquid in the process.

Piston is intermittently raised by a mechanical lifting mechanism and then allowed to fall by gravity.



NORCROSS

A recorder controls the frequency of lifting, receives the time signals from the measuring element and converts the time of fall data into a complete viscosity record.

Measuring elements are applicable for measuring viscosities from .1 to 1,000,000 cp. and are use with the company,s recorders.

Norcross Corp., Dept. #N47, Newton 58, Mass.

MEASURING GRADUATE
Tough, Lightweight Plastic

Clear, glass-like plastic graduate made of tough, lightweight plastic.

Unbreakable under normal usage. Will not craze and cloud. Surface is smooth, hard, easy to clean, and will not slip when wet. Liquids will not permeate it.

Markings in both ounces and metric measure. Conical in shape with large, non-tip, non-roll octagonal base.

Available in 4, 8, 16, and 32 ounce sizes.

Needs Corp., Division 237, Dept. PVP, 255 W. Euclid Ave., Jackson, Mich.

MELTING APPARATUS
Rapid Heating

New melting point apparatus said to be eminently successful in carrying out accurate, reproducible determinations in a minimum of time.

Heating is rapid to within five or ten degrees of the melting point. Further temperature increases can then be reduced to one or two degrees per minute.

Appartus saves considerable time between tests because the small mass of heating fluid used plus its low specific gravity allows rapid cooling. Without compressed air, cooling takes ten minutes from 300 to 100°C, and eight minutes more to 60°C. With compressed air, the corresponding times are four minutes and one and one-half minutes.

Arthur S. LaPine & Co., Dept. PVP, 6001 South Knox Ave., Chicago 29, Ill.

MERCADIUM COLORS
New Series Available

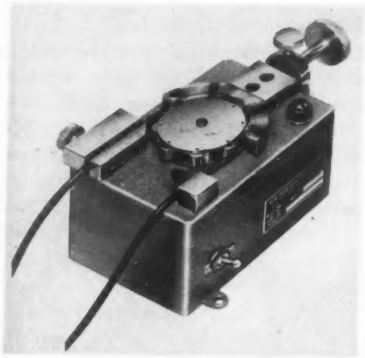
A new series of less reactive Mercadium colors now offered. Colors range from deep orange GP to maroon GP.

Gives excellent compatibility in all vehicle types. Has good dispersion properties and extremely soft texture.

Another new series available designed for use where high tinctorial value at a lower level of pigment loading is desirable. Colors range from light red conc. to dark red conc. Possesses previously mentioned properties.

Both series said to offer clean, brilliant hues, excellent chemical and solvent resistance, and good heat resistance.

Imperial Paper & Color Corp., Pigment Color Division, Dept. PVP, Glens Falls, N. Y.



NEW BRUNSWICK

METERING PUMP
Transfer Liquids & Gases

A series of continuous-duty metering pumps that transfer liquids and gases through plastic or rubber tubing at exceptionally slow rates.

Adaptable for wide variety of applications, any one of the model PA Peristaltic Pumps may be used as a metering device to move materials into reaction vessels, or as an auxiliary pumping unit in conjunction with other equipment.

All model PA Peristaltic Pumps accommodate tubing of maximum outside diameter of ¼". Standard model operates at rotor speed of 56 rpm.

Weighs 8½ pounds. Pump can be stood up on end, can lie flat, or can be hung or bolted on wall or panel.

New Brunswick Scientific Co., Dept. PVP, P.O. Box 606, New Brunswick, N.J.

MIXING MACHINE
360° Screen Area

Unique whirling-blade design

with 360° screen area makes fast work of granulating, pulverizing, shredding, pulping, chopping, mixing, color-blending, dispersing, dissolving, etc. Gives uniform particle size, without excessive "fines."

"Tornado" Mill is available in three sizes at present.

Material is ground and mixed by a cluster of whirling blades attached to a common vertical shaft. These create an air flow that is a virtual tornado and throws the material outward at high velocity against a cylindrical mesh screen which completely surrounds therotor. In the process, the material is reduced in particle-size uniformly, without excessive "fines," and is thoroughly blended or mixed.

The mill is a compact unit, with drive motor and grinding head balanced on a cross beam supported on a vertical column. Grinding speed can be varied at will by selecting from three reduction ratios offered by the three step pulleys on the motor and grinder. The belts are totally enclosed for safety and cleanliness. The standard units now available are all mounted on castors—for the maximum mobility from point to point within the customer's plant.

STOKES

F. J. Stokes Corp., Dept. PVP, 5500 Tabor Rd., Philadelphia 20, Pa.

MIXING PROPELLER
For Intensive Mixing

"Claw" mixing propeller recommended for propeller type machines.

Claimed to mix smooth those products that have a stubborn tendency to remain lumpy. Powders and other soluble solids said to go into finished solution fast.

CRADDOCK

"Claw" propellers are formed from polished stainless steel plate by powerful precision dies, true balance.

Stock diameters available: 3", 4", 5", 6", 7", 8", 10", and 12".

Craddock Equipment Co., Inc., Dept. PVP, 1507 "A" Street, Wilmington, Del.

MODIFIED ALKYDS
For Floor Waxes

Two synthetic resins are said to make possible self-polishing floor waxes that do not water spot, yet are easily removed when floor must be cleaned.

Products designed to be used in polishes in place of shellac. Said to cost less than the natural material. Products, called Waterez 1550 and 1551, are alkali-dispersible modified alkyds resulting from esterification of phthalic anhydride with polyols.

Resins said to retain light color better than shellac and to resist blocking during bag storage. Said to be compatible with and to supplement the properties of the polymer latices and other resin dispersions used in newer "waxless" polishes, as well as natural and synthetic waxes used in conventional floor waxes.

Reichhold Chemicals, Inc., Dept. PVP, RCI Bldg., White Plains, N. Y.

O

OXYGEN INDICATOR
Measures by Detector Cell

M-S-A portable oxygen indicator for checking oxygen deficiency or conditions in an atmosphere that might increase fire and explosion hazards.

Measures the per cent of oxygen throughout a range of 0 to 25% oxygen content by volume with an accuracy of plus or minus ½%.

Instrument enclosed in case 6¾ x 4⅛ x 5¾ inches and weighs 5¾ lbs. complete with sampling line.

Mine Safety Appliances Co., Dept. PVP, 411 Seventh Ave., Pittsburgh 19, Pa.

P

PACKAGE CLIPPER
For Sealing Containers

Clip-Top Packer, Model M, closes any average shipping case in a few seconds time.

Seals filled containers from the outside and "sets-up" flat cartons, ready to be filled.

Stainless steel negator spring feed assures smooth staple flow by exerting a constant tension at all times. One piece construction.

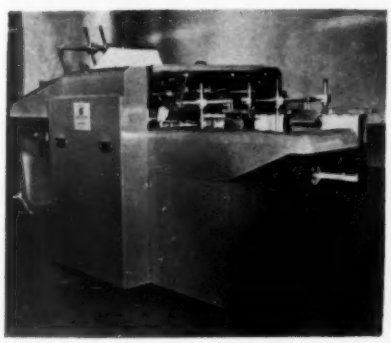
Container Stapling Corp., Dept. PVP, 308 N. Park Ave., P.O. Box 247, Herrin, Ill.

PACKAGING MACHINE
Compact and Flexible

Jak-Et-Pak-50, compact and flexible multiple packaging machine designed for broad application of wrap-around multi-unit cartoning at a low cost.

Has dimension of 10′4″ in length by 4′2″ in width. Machine has a wide packaging size range.

Presents wide possibilities for automatic multiple unit packaging.



CONTINENTAL CAN

Changeover from double line to single line packaging easily accomplished.

Double action lock provides easy opening device. Locking mechanism contains no moving parts.

Boxboard & Folding Carton Division, Continental Can Co., Dept. PVP, 530 Fifth Ave., New York 36, N. Y.

PAILS AND DRUMS
With Plastisol Linings

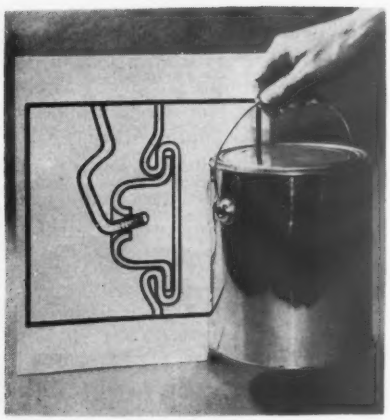
Pails and drums with plastisol linings for the shipment of hard-to-package chemicals, foods and drug products.

Approved by the U. S. Department of Agriculture, plastisol linings are made of finely-powdered vinyl resins and plasticizers. Are sprayed on and, when baked, form a dense, flexible, extremely tough and slick-surfaced film.

Containers available with dry-film thickness that varies from 6 mils up to 12 mils.

Linings claimed to have unusual resistance to water absorption. Possess high degree of elasticity and resiliency.

Jones & Laughlin Steel Corp., Container Division, Dept. PVP, 405 Lexington Ave., New York, N. Y.



AMERICAN CAN

PAINT CAN
Solderless Clinched Ears

One-gallon paint can with solderless clinched ears developed.

Clinched ear construction method said to provide excellent accident-proof handling.

Simplified drawing illustrates method of attaching the ears by "bumping" a can body fold over the ear flange.

American Can Co., Dept. PVP, 100 Park Ave., New York, N. Y.

PAINT LATEX
Non-Foaming

A new paint latex, claimed to exhibit remarkable resistance to foaming and excellent water resistance, has been introduced.

Known as Dylex Latex K-31, the new formulation is a stable water dispersion of a styrene-butadiene copolymer fortified during polymerization.

Dylex Latex K-31 is characterized by an extremely uniform particle size, resulting in films of superior packing density. A typical photomicrography shows the particle size to be 0.200 microns with a variation of only plus or minus 0.003 microns.

Tests show that Dylex Latex K-31 may be used alone or in combination with other film formers including long oil alkyds, proteinaceous or cellulosic water soluble resins, or in combination with conventional, stable, styrene-butadiene latices.

K-31 said to produce water base paints with improved scrubbability and stain removal, and excellent storage and freeze-thaw stability.

Paints prepared with the new latex may contain typical water dispersable pigments and low cost extenders.

Koppers Co., Inc., Dept. PVP, Pittsburgh 19, Pa.

PAINT MIXERS
Two Sizes

New line of Thor-O-Mix paint mixers in two sizes—Model A for gallons and smaller, Model B for quarts and smaller.

Claimed entirely new design and construction, these mixers employ a unique "pitch-tilt" throwing action that assures fast, thorough mixing of all kinds of paints or liquids. Even tightly caked pigments, metal pigmented paints, transparent color paints, house paints, etc. said to be quickly broken up and mixed in minimum time.

The machine consists of a frame which houses the 60 cycle 110 volt electric motor, as well as the gearing and eccentric which drives a rubber connecting rod to vibrate the cradle as it rocks on its two rubber bearing blocks. The oil bearings require no oiling. Rubber gripping pads, tightened by a hand-knob, hold either round or square cans in the cradle. Containers cannot fly loose or shake out.

BECK

Four rubber suction feet cushion the vibration and prevent creeping. A convenient on-off switch is provided. Machine is light weight for portability and compact for space saving on floor or counter.

Beck Equipment Company, Dept. PVP, 3350 West 137th Street, Cleveland 11, Ohio.

PAINT TUBE SQUEEZER
No Waste or Smearing

Compact machine for discharging full contents of paint tubes without waste or smearing and suitable for convenient on-the-counter or workbench installation.

Called "Paint Tube Squeezer," model PTS1, lightweight unit said to completely eliminate "pale" tints by providing a full charge of even the stiffest pigments into the liquid vehicle. Work area requires a depth of 26½".

Squeezing cannot begin until manually-controlled handle is set in motion.

Instantly adjustable height column to avoid splatter also available.

Red Devil Tools, Dept. PVP, Union, N. J.

PAPER THERMOMETERS
Irreversible Color Change

Thermopaper and Thermotube disposable paper temperature indicators now available for 100, 105, and 110°F. to supplement the previously available range of 115 through 490°F.

They measure temperature by

exhibiting an irreversible color change when subjected to predetermined temperatures. Speed of response is faster than a tenth of a second and accuracy is one per cent.

Paper Thermometer Co., Dept. PVP, 10 Stagg Drive, Natick, Mass.

PHTHALOCYANINE PIGMENT
Red-Shade; Crystal Stable

A very red-shade phthalocyanine blue pigment that is crystal stable is available in Cyan Blue XR-55-3770.

Cyan Blue XR-55-3770 claimed to maintain its good initial bright hue and depth of color.

Said to develop a good red shade and display good dispersion and compatibility in solvent systems and in amine-modified alkyd baking enamels.

Product has the following properties: Specific gravity—1.52; Wt./gal., lbs.—12.7; Bulking value, gal./lb.—0.0787; Oil absorption—19.2.

Excellent resistance to bleed also claimed along with excellent light fastness and acid and alkali stability.

American Cyanamid Co., Pigments Division, Dept. PVP, 30 Rockefeller Plaza, New York 20, N.Y.

PINE OIL REPLACEMENT
Variety of Uses

Chemical formulation, Hodag PX-1, to be used as a replacement for pine oil.

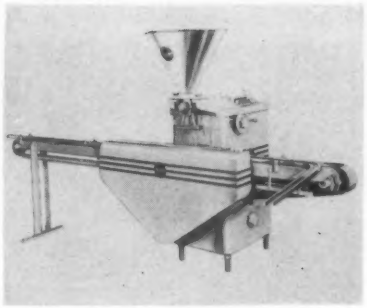
Proprietary combination of alcohols, hydrocarbons, and surface-active chemicals. Used as an anti-foam, leveling agent, and solvent in a broad range of applications.

Used as a replacement for pine oil in most formulations and processes where "preservative" properties are not required.

Hodag Chemical Corp., Dept. PVP, 7247 N. Central Park, Chicago 45, Ill.

PISTON FILLING MACHINE
For Small Containers

Piston Filling Machine, type 15 RC 1210 now available for filling small metal containers with ¼ oz.



HOPE

of oil paint, ten containers at a time, at speeds of 200 containers per minute.

Machine will also perform at similar speeds, filling ⅛ oz. to 2 oz. containers with liquid or semi-viscous products.

Features include high speed rex table top cross conveyor timed with filling cycle. Bottom-up fill accomplished with a special rising conveyor table. "No-container—no fill" control on infeed conveyor. Piston assembly either single or double valve.

Hope Machine Co., Dept. PVP, 9400 State Road, Philadelphia 14, Pa.

PLATE FILTER
Horizontal & Tankless

Low-cost tankless horizontal plate filter called model TL.

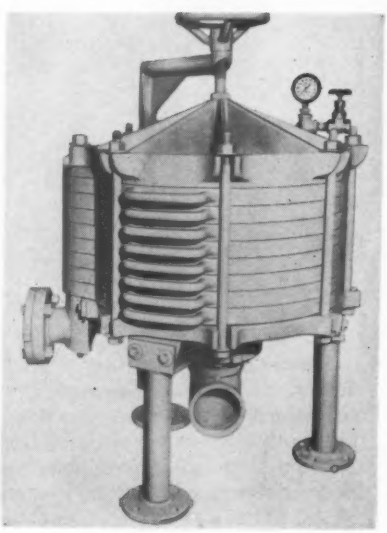
Design eliminates the necessity of a tank by having filter plates serve as a filter unit within themselves.

Several measures have been taken to eliminate leakage. Requires minimum amount of floor space and available in capacities up to 396 sq. ft. of filtering area.

No unfiltered heel at end of cycle and filter cake can be blown by means of gas or air pressure. Standard operating pressures are 150 lbs.

Sparkler Manufacturing Co., Dept. PVP, Mundelein, Ill.

SPARKLER



POLYELECTROLYTE
Prevents Flocculation

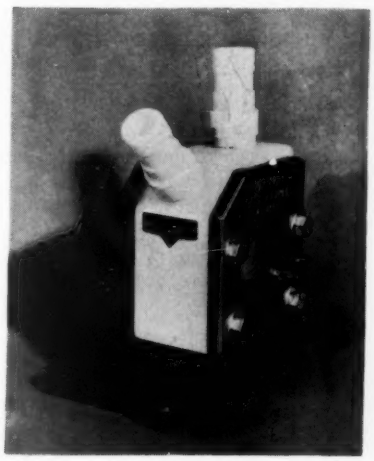
Alcogum AN-25, a polyelectrolyte which combines the properties of deflocculation and colloidal protection for dispersions of dry powders is available.

Supplied as a water solution. Stabilizes dispersions and emulsions against settling or caking during storage.

Said to improve, in certain applications, spreading characteristics to enhance color by preventing flocculation.

Is easy to handle and will pour from a faucet.

Alco Oil & Chemical Corp., Dept. PVP, Trenton Ave. & William St., Philadelphia 34, Pa.



VANTON

POLYETHYLENE PUMP
Increased Temperature Range

New Marlex 50 polyethylene pump construction makes it possible to handle extremely corrosive fluids up to 260°F. Conventional polyethylene is limited to 140°F.

New material also possesses close dense molecular structure which results in high tensile strength and low permeability. Said to offer

excellent impact strength and high degree of crystallinity.

Available in capacities from ⅓-40 GPM.

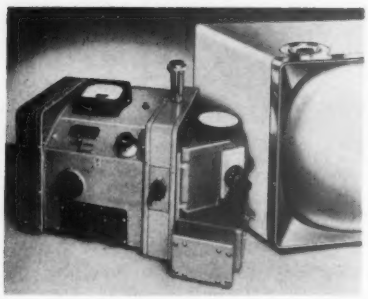
Vanton Pump & Equipment Corp., Dept. PVP, 201 Sweetland Ave., Hillside, N. J.

POLYURETHANE SOLVENTS
For Resin Coatings

Cellosolve Acetate (99%) and Ethyl Acetate (99.5%) are newly developed grades of these esters which are said to fulfill the exacting solvent requirements for polyurethane resin coatings.

Excellent stability claimed.

Union Carbide Chemicals Co., Dept. PVP, 30 E. 42nd St., New York 17, N.Y.



INSTRUMENT

PORTABLE COLORIMETER
For Large Flat Surfaces

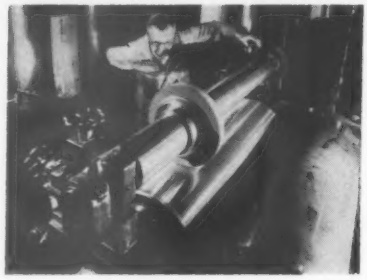
Design change in "Color-Eye" portable electronic colorimeter with abridged spectrophotometer makes possible precision color control on large flat surfaces, according to manufacturer.

Instrument is said to handle all kinds of materials and to measure color differences in both reflected and transmitted color. Reduces color to numerical values for use in setting up color standards detecting color variations in raw materials, detecting drift in both the sample and production color, bringing production colors within acceptable tolerances and reducing or eliminating metamerism.

Instrument Development Laboratories, Inc., Dept. PVP, 67 Mechanic St., Attleboro, Mass.

PORTABLE GRINDER
Eliminates Time Loss

"In place" portable grinder said to have eliminated the laborious and time consuming method used to retrue large rolls in roller mills.



ROY & SON

In the past, hand stones or other hand held abrasives were used to touch up nicks or gouges. Close tolerance grinding, however, was impossible unless the mill was dismantled and the rolls returned to the manufacturer. Now, portable grinder redresses to within .00045 on roundness and straightness right on the mill.

Periodic redressing, according to the manufacturer, also eliminates the need of removing several thousandths of stock to establish trueness.

B. S. Roy & Son, Dept. PVP, Worcester, Mass.

PORTABLE MIXER
New Design Clamp

New line of portable process mixers designed to meet highly critical operating conditions has been placed on the market.

JENSEN

These mixers feature a new design clamp using a worm-gear adjustment which eliminates possibility of tank damage or batch loss.

Units are also available for fixed mounting on either open or closed tanks.

Jensen Engineering Co., Dept. PVP, 5354 So. Garnett Road, P.O. Box 4507, Tulsa, Okla.

CONSOLIDATED SIPHON

PORTABLE MIXER
Three-Speeds

Three-speed portable mixer for stirring, blending, mixing and agitating is new being marketed to the processing industries.

Unit comes equipped with rollers for easy portable operation, and both the propeller and stand shafts are adjustable for unlimited settings for "above-and-below" floor level tanks. All parts which come in contact with ingredients are of stainless steel.

Mixer is fitted with standard belt drive for propeller speeds of 175 r.p.m., 325 r.p.m. and 575 r.p.m. The ¼ HP motor is equipped with 6″ blades on the mixing shaft, the ½ HP with 8″ blades, and the ¾ HP with 10″ blades. Other combinations of blades to 18″ with larger HP motors are available.

Terriss Division, Consolidated Siphon Supply Co., Inc., Dept. PVP, 22 Wooster St., New York 13, N. Y.

PORTABLE PRINTER
500 Pails Per Hour

Quality printing on five-gallon pails claimed to be possible at extremely low cost with a new portable printing device.

Called the Chapco Print-A-Can Printer, the machine will handle up to 500 pails per hour.

Will handle all types of five-gallon pails—open or closed head, with or without rolling hoop. Weighs 160 pounds.

BENNETT

Operation is mechanical, requiring no electric or air power. Printing area is 9″ x 14″. Type as small as ten point may be reproduced satisfactorily. Each plate said to be good for many thousands of impressions.

Ink available in most colors. Dries to touch when applied. Two colors may be applied simultaneously.

Accessory available for printing 30 and 55-gallon drums.

Bennett Industries, Inc., Dept. PVP, Peotone, Ill.

POWER STACKER

For 2000 Lb. Loads

New 24-volt Walkie Stacker, for 2000 lb. palletized loads.

Model handles loads up to 48″ x 48″ and will stack them more than ten feet high. Power unit is of compact design. Four six-volt batteries mounted in pairs on each side of the drive unit.

Walkie Stacker will enter pallets at right-angles in aisles as narrow at 53″.

All controls for travel speed and direction, elevating and lowering, are clustered on the steering handle control head.

Available with elevated heights of 52″ to 124″.

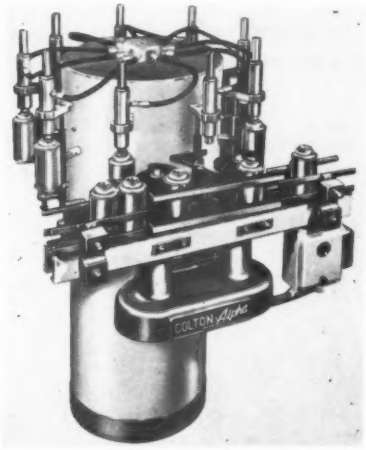
Raymond Corp. Dept. PVP, 345-169 Madison Ave., Greene, N.Y.

PRESSURE FILLER

For Aerosol-Type Containers

No. 1651 line of high speed production line rotary pressure fillers that fill aerosol-type containers with several different types of liquid propellants.

Filler features precision pressure filling heads that will handle butane and propane straight hydrocarbon-type propellants as well as the usual fluorinated hydrocarbon types with complete safety.



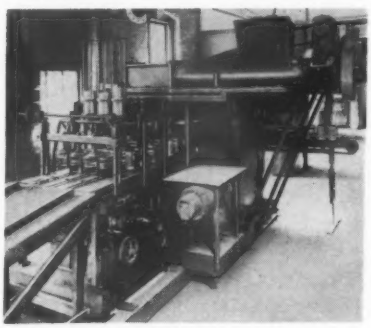
ARTHUR COLTON

Made in standard models which will fill containers with propellant following product filling, dispenser valve insertion, and valve crimping operations.

Production rates of up to 200 cans per minute. Adjustable fill capacities of up to 300 grams of propellant.

Fillers occupy a floor space approximately 30″ x 40″ and are about 60″ high.

Arthur Colton Co., Dept. PVP, 3400 East Lafayette, Detroit 7, Mich.



HOPE

PUTTY FILLING MACHINE

High Speed, Automatic

A high speed, automatic filling machine for putty and glazing compounds makes possible filling of the materials into one, three or five-pound cans on the same machine.

Machine feeds desired container into filling position. A specially designed feeding mechanism moves putty from hopper to manifold chest directly above three operating valves. Action of piston filling arrangement draws exact quantity to be deposited into each cylinder.

Automatic disc placer inserts parchment disc, and automatic lid dispenser picks and places a lid on each container. Change over for various sized cans may be accomplished in 30 to 40 minutes, according to manufacturer.

Hope Machine Co., Dept. PVP, 9400-70 State Rd., Philadelphia 14, Pa.

PVAc EMULSION

Borate Compatible

Polyvinyl acetate polymer, Cal-Vyn CM-300, has been made available.

Said to produce a crystal clear, tough, water-resistant, high-gloss, water-white film. Is inherently flexible to the degree that it requires only 5% of 7.5% chemical plasticizer. Will form a continuous clear film at room temperature.

Claimed to have a low particle size. Highest quality paints can be formulated at low as well at high pigment loadings.

Lends itself to paint production on all types of paint mills and dispersion units, and has excellent mechanical stability.

Calvert-Mount Winans Co., Inc., Dept. PVP, 2335 Annapolis Ave., Baltimore 30, Md.

PVAc EMULSION

For Aluminum Paints

Flexbond Exp. F-136 now makes possible the formulation of new type of aluminum paint, a water-based emulsion free of flammable solvents.

Flexbond F-136 is a polyvinyl acetate copolymer emulsion. When formulated, it will not bleed over asphaltic surfaces and has good adhesion over variety of substrates, including galvanized iron.

Colton Chemical Co. Division of Air Reduction Co. Inc., Dept. PVP, 1747 Chester Ave., Cleveland 14, Ohio.

PVAc Emulsion

For Water-Based Paints

New polyvinyl acetate emulsion

specifically designed for use as the vehicle in gloss and semi-gloss water based paints.

New emulsion, designated as Gelva Emulsion TS-66, is expected to open the estimated $200 million annual retail market for interior gloss paints to polyvinyl acetate systems.

Emulsion, which may be formulated into stable paints with a long shelf life, is said to provide a degree of gloss and film hardness comparable to that of a quality oil formulation. In addition, unlike present polyvinyl acetate emulsions for gloss, Gelva TS-66 does not require any special additives and may be compounded easily in regular emulsion paint equipment.

Shawingan Resins Corp., Dept. PVP, Springfield 2, Mass.

PVAc EMULSION
Gives Good Adhesion

Polyvinl chloride-acetate copolymer emulsion, said to be the first designed for good adhesion characteristics, is now being marketed.

Called Resyn 2507, product is said not to require additives or thickeners to increase viscosity, nor pre-emulsification of plasticizers. Can be plasticized directly by user with monomeric plasticizers or with acrylic latices.

Provides balanced adhesion between vinyl and polar materials, while combining outstanding properties of polyvinyl chlorides and polyvinyl acetates in the wet state. Properties include good wet tack, exceptional mechanical stability, superior hold-out on porous surfaces and easy heat sealing, according to manufacturer.

National Starch Products, Inc., Dept. PVP, 270 Madison Ave., New York, N. Y.

PVAc Emulsion
Versatile Emulsion

Two new polyvinyl acetate emulsions available to be sold under the designation "Elvace."

"Elvacet" 1423, a copolymer emulsion, may be used without adding a plasticizing agent. "Elvacet" 1440, a homopolymer emulsion, requires the addition of a plasticizer to achieve flexibility.

Said to be easily applied by brush, roller or spray gun and dry to the touch in 30 minutes. Have no lingering odor and resist yellowing or discolorization.

E. I. Du Pont de Nemours & Co., Inc., Dept. PVP, Wilmington 98, Del.

PVC DISPERSION
For Plastisols and Organosols

A polyvinyl chloride dispersion resin developed for plastisol and organosol applications has been introduced.

Called Pliovic VO, product said to exhibit exceptional electrical properties and viscosity stability characteristics. Wide flexibility in choice of compounding ingredients made possible through low initial viscosity and good shelf life. Said to have low watter absorption.

Among applications are decorative and protective metal coatings and hot dip and cold dip compounds. Metal coatings based on product said to be easily spread or spray applied.

Chemical Division, Goodyear Tire & Rubber Co., Dept. PVP, Akron 16, Ohio.

R

RECORDER CONTROLLER
For Humidity & Temperature

Variable-range humidity and temperature recorder controller said to be of high accuracy now available.

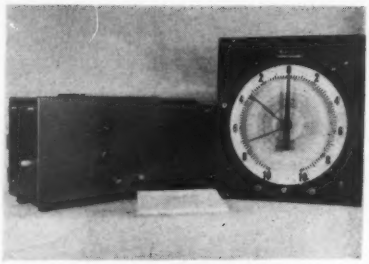
Two-section instrument provides humidity readings to ±3% R.H. within its operating range of 15% to 95% R.H. at temperatures from +32° to +130°F.

Temperature claimed to be accurate to ±1°F. over a range of 0° to 100°F. A bi-metal cantilever temperature sensing element is used.

Control range for each of the conditions determined by locating recording-chart electrical contact blocks on a positioning post in the sensing section.

Pen-block relay control circuit broken to prevent excess arcing. Control circuit electrically checked at variable timer-controlled intervals from 1 to 27½ minutes.

Serdex, Inc., Dept. PVP, 12 Bowdoin Sq., Boston 14, Mass.



GARDNER

RECORDING REFLECTOMETER
Aid in Color Control

Gardner Automatic Recording Reflectometer is capable of measuring whiteness, degree of yellowness, bleaching and fading, amount of blueing, tinting strength, and other factors in color control.

Instrument comes as complete unit with Recorded and Item UX-2a Exposure Head. Mounting arrangements must be made by purchaser. Exposure Head is dust-tight. Reflectance measured as the ration of light in the test beam relative to that in comparison beam.

Instrument may also be used to measure opacity and hiding power of films. Both magnitude and direction of color-difference can be measured in evaluating color change. Instrument also permits estimation of which a number of samples is closest to standard.

Gardner Laboratory, Inc., Dept. PVP, 5521 Landy Lane, P.O. Box 5728, Bethesda 14, Md.

RED PIGMENTS
Lightfast & Durable

New family of red pigments giving durable red shades for automobile finishes, paints and other products.

Said to combine excellent lightfastness, brilliance, bleed resistance, chemical inertness, heat stability, working properties and a desirable color range. Because of the intensity of "Monastral" reds, strong colors can be produced, even when let down with white or used in metallic or polychromatic finishes.

Tests of water emulsion house paints show excellent lightfastness of "Monastral" reds, particularly in pastel shades.

E. I. du Pont de Nemours & Co., Inc., Dept. PVP, Wilmington 98, Del.

RED PIGMENTS
Pyrazolone Type

Two Pyrazolone red pigments have been developed for use in paints. Products are Plasticone Red Light 10465 and Plasticone Red Medium 10464.

The light pigment is a very opaque, bright light shade. Medium shade pigment is of medium opacity and brightness. Pigment 10465 is recommended for bright shade, good opacity, excellent heat resistance and relatively good light resistance in full shade. Said to be suitable for newer enamels where high bake requirements have made formulation difficult.

Lightfast Molybdate Orange Deep 12165 may be combined with 10465 for lighter shades. Plasticone Maroon 10458 may be combined for darker shades.

Pigment, Color & Chemical Division, Sherwin-Williams Co., Dept. PVP, 260 Madison Ave., New York 16, N. Y.

RED PIGMENT
Yellowish-Red Shade

Orion Red CP-1300 said to be an entirely new type pigment now available. It has an exceptionally bright yellowish-red shade and is very opaque.

CP-1300 has excellent heat resistance, very good bleed resistance and fair resistance to light. It is an easy grinding pigment.

The excellent opacity claimed, bright shade and non-bleeding properties make it desirable for use in finishes which do not require the greatest durability.

Pigment, Color and Chemical Division, The Sherwin–Williams Company, Dept. PVP, 260Madison Avenue, New York 16, N. Y.

DEODORANT CHEMICAL
For Odor Control

The strong odors of paint solvents can be controlled with the addition of Alamask DS.

Alamask DS is a new addition to the family of Alamask chemicals which have been found to abate abnoxious odors from many natural and synthetic substances.

Alamask DS does not leave a residual odor of its own. In hydrocarbon solvents, concentrations of only 0.001% to 0.01% by weight are normally needed to nullify offensive odors.

Rhodia, Inc., Dept. PVP, 60 East 56th St., New York 22, N. Y.

RESINOUS POLYOL
Good Color Retention

A development chemical, Resinous Polyol X-450, has been made available in drum quantities.

Product is described as being hard and colorless, with an average of five to six primary hydroxyls per molecule. Chemical structure ideally may be regarded as poly (1-phenyl, 3-hydroxymethyl butene).

Esterifications may be carried out readily with excellent retention of original good polyol color, according to manufacturer. Protective coatings made with esters or alkyds of product said to have many valuable properties suggesting possible use in industrial coatings.

Shell Chemical Corp., Market Development Dept., Dept. PVP, 50 W. 50th St., New York 20, N. Y.

DEXTER

ROTARY PUMP
Gas-Tight, Oil Free

Oil-free rotary pump equipped with shaft seals for gas-tight operation at pressures up to ten psi is now available.

"Dri-Air" pump has graphite vanes and lifetime bearings, requires no lubrication in service, according to manufacturer. Shaft seals also said to require no lubrication so that pump components cannot contaminate air or gas stream.

Shaft seals make pump adaptable for handling gasses which might be harmful to personnel or equipment should they leak into surrounding areas. Constant delivery volumes and pressures provided by sliding carbon vane which seats itself be centrifugal force against inner wall of housing.

Construction normally of cast iron, but bronze or aluminum may be supplied for special applications.

The Dexter Co., Dept. PVP, Pearl River, N. J.

S

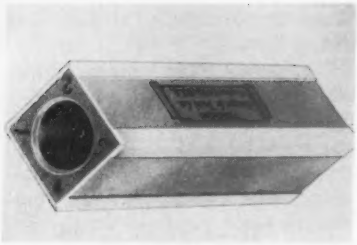
SAFETY CAN
Oval Shape

New oval shape makes a more compact container; requires far less storage space and said to be much easier to handle and use. Five oval shape cans are easily stored in storage cabinets and safety vaults in the same area required for three of the customary round safety cans. More storage room is made available for other flammable liquid containers used in production work without the necessity of adding new storage cabinets or increasing storage areas.

Flexible metal pouring spout eliminates hazardous spillage when dispensing, and permits filling of containers with small receiving openings without waste. Pouring spout swivels to a "tuck-away" position over the can body when not in use to save additional space and permit cans to be placed close together. Carries easily in a natural close-to-the-body position and handles without effort when dispensing.

Sturdy, terne plate body withstands even careless usage. All seams are lap-joined and then electrically seam welded into a single leak-proof container; terne plate construction provides for inside and out lead-coating for greater resistance to corrosion. Sides of the safety can are debossed for added strength and a shock rim at bottom raises the body.

Protectoseal Company Dept. PVP, 1920 So. Western Avenue, Chicago 8, Ill.



PRECISION

SCRAPER
Four Working Edges

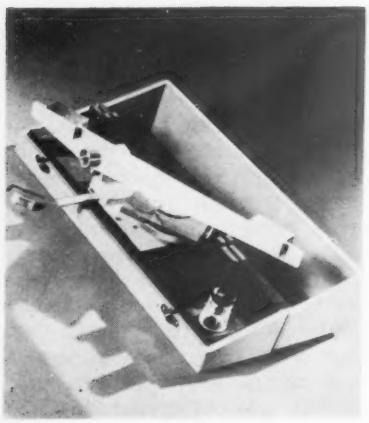
New, unique scraper with four working edges now available.

Used in conjunction with the "Fineness of Grind" gage, it is claimed to have twice the life of the conventional 2-edge adco or knife-edge scrapers and is available in steel or hard chrome plate at only a slight increase in price over the conventional scrapers.

Highly recommended for those who use these gages constantly.

Light in weight, it is easy to clean and handle and each edge is numbered. One edge can be used as a master to occasionally check the other three edges for wear.

Precision Gage & Tool Company, Dept. PVP, 320 E. Third Street, Dayton 2, Ohio.



TABER

SCRATCH TESTER
Fast and Accurate Readings

Shear/Scratch testing instrument is a device for testing the surface quality of organic materials and plastic coated surfaces to resist digs, scratches, scrapes, engravings, and similar physical damage not classed as normal wear.

Fast and accurate test readings are claimed to be taken directly from a finely balanced scale beam, calibrated in grams, to which are attached either a precision ground contour shear tool or a conical or cube point diamond tool.

R. L. Oldenberg, Section 233, Taber Instrument Corp., Dept. PVP, N. Tonawanda, N.Y.

SCROLL
Time Saving Accessory

Time-saving accessory for the Lehmann Vorti-Siv has recently been introduced.

LEHMANN

The device is called a scroll and its purpose is to discharge automatically the tailings of any material being screened. It converts the Vorti-Siv action from a batch operation to a continuous process.

The scrolls are made in one turn, two turns or three turns and are furnished in clockwise or counter clockwise design. The number of turns required can be determined by factory tests on the material to be screened.

J. M. Lehmann Co., Dept. PVP Lyndhurst, N. J.

SEMI-AUTOMATIC BALANCE
Rough and Fine Weighing Beams

A one-pan analytical balance for weighings from 0.1 milligram to 200 grams has been announced.

Balance features "Two-Beam Construction." All weighings from one to 200 grams are made to within one gram on a "rough-weighing" beam. Operator does not have to watch reticle during rough weighing. Amber lights at eye level indicate which way weight control knob should be turned to adjust within one gram.

Weighing adjustments from 1/10 milligram to one gram are made on "fine-weighing" beam completely automatically. Two-Beam Construction said to reduce knife edge wear on fine-weighing beam and prolong accuracy of balance..

TORSION BALANCE

Instrument is temperature-compensated, provides large unobstructed access to weighing chamber, and has conveniently placed weight control knobs and oil damping.

The Torsion Balance Co., Dept. PVP, Clifton, N. J.

"SHELF-LIFE" PAIL
Reduces Skinning Condition

Two-gallon "Shelf-Life" 8 lug cover pail, designed to reduce skinning condition prevalently found in packaging alkyd, odorless, and shelf-life paints.

Pail claimed to increase the resistance to skinning of alkyd, odorless and other paints prone to skinning by at least 300%.

Fein's Tin Can Co., Inc., Dept.

FEIN'S

PVP, 50th Street & First Ave., Brooklyn, N. Y.

SILICONE ANTIFOAMS
Fast Dispersion

Series of silicone antifoams now available.

Several advantages of this new series are claimed. Silicone antifoams disperse immediately to provide quick foam knock-down; they are supplied as concentrates ready to use on delivery, or for quick, convenient dilution; they last longer, making them ideal for continuous processing; and they have a long storage life, can be frozen, boiled, or sterilized without losing effectiveness.

Hodag Chemical Corp, Dept. PVP, 7247 N. Central Park, Chicago 45, Ill.

SILICONE INTERMEDIATE
Epoxy Type

An organo functional silicone intermediate identified as Syl-Kem 90 has been introduced.

Product is an epoxy silicone combination with an epoxy group on each end of the molecule, 1,3-bis [3-(2,-3-epoxypropoxy)propyl] tetramethyl-disiloxane. Epoxy groups undergo typical reactions of glycidyl ethers.

Chemical said to greatly improve resistance to low temperature cycling when added to common epoxy casting resins. May also be used in epoxy curing agents and as reactive deluent.

New Products Dept., Dow Corning Corp., Dept. PVP, Midland, Mich.

SILICONE RESIN
For Cold-Blending

A silicone resin designed for cold-blending with alkyd, melamine and acrylic type baking enamels to impart improved color and gloss retention, thermal stability and resistance to weathering has been developed.

Resin, designated R-64, is expected to find wide use as a base for aluminum paints to operate in the 500-1200° F. range. Said to be effective at concentrations as low as 10-20 per cent.

Other applications already developed include external coatings for heating equipment and exhaust systems and enamels for motors and electrical components and appliances.

Silicones Division, Union Carbide Corp., Dept. PVP, 30 E. 42nd St., New York 17, N. Y.

SODIUM SULFONATE
Oil-Soluble

Lighter-colored sodium sulfonate now available.

New Sulfonate LC has a maximum ASTM (dilute) color specification of 3½ and is available in tankcar and tanktruck quantities.

Product is recommended for compounding, emulsifying, dispersing, and wetting agents; rust and corrosion inhibitors; demulsifying agents; dry cleaning compounds; fat-splitting agents; flotation agents; fuel oil, grease, and lubricating oil additives; metalworking oils; textile oils; and pigment dispersing agents.

Sun Oil Co., Dept. PVP, 1608 Walnut St., Philadelphia 3, Pa.

SOLID EPOXY RESINS
High Purity

Three new solid epoxy resins have been developed.

Designated D.E.R. 661, 664, and 667, the resins will be used in coating for appliances, auto body primers, cans, drums, tank cars, and for industrial maintenance.

Superior purity is claimed, a rharacteristic which will enable crocessors to use the dissolved epsin without filtering.

Resins have a color rating of one maximum, meaning extreme clarity.

Have lowest sodium content of any epoxy resins available, according to the firm, giving them better electrical and coating performance. Also, the resins have a narrow specification range.

D.E.R. 661 is a low molecular weight resin for catalytically cured coatings, and can be cured at room or slightly elevated temperatures. D.E.R. 664 is useful in ester type one-component systems needing no curing agent, while 667 is catalytically cured, requiring high baking temperatures, and gives maximum flexibility and toughness.

Dow Chemical Co. Dept. PVP, Midland, Mich.

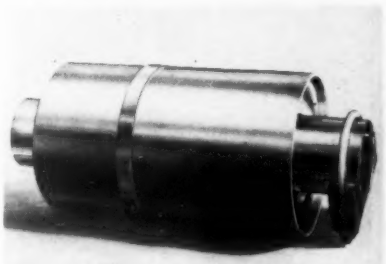
SOY DISPERSING AGENT
For Water-Based Paints

Soy dispersing agent designed to perfect water-based paints.

The product, trademarked "DispersaGen" said to disperse pigments exceptionally well and minimizes tendency of suspensions to separate.

It is non-ionic, pale colored, low in viscosity and easy to handle.

General Mills, Inc., Dept. PVP, Kankakee, Ill.



ERICKSON

SPARK ARRESTOR
Cyclonic Action

Compact spark arrestor that approximates the size and shape of a muffler is now ready for forklifts, pickups and loaders.

New type of gill spark arrestor uses straight-through exhaust-flow principle and cyclonic action that is said to be almost 100% efficient in trapping dangerous incandescent exhaust carbon.

Highly efficient at all throttle ranges. Back-pressure claimed to be very low. Having both inlet and outlet fittings, it can be placed at the end of, or within the exhaust system, and mounted at any angle.

Arrestor can, in most operations, replace the muffler. Available to accommodate both gas and diesel engines up to 325 cubic inch displacement.

Erickson Products Co., Dept. PVP, 1960 Carroll Ave., San Francisco 24, Calif.

SPECTROMETER
Glow Tube Readout System

Direct reading spectrometer with a completely automatic glow tube readout system has been developed for the National Bureau of Standards.

Said to be the first unit of its

kind to present information capable of being fed directly into electronic computers. Performs 1080 determinations with complete data processing in about 2 hours.

Reliability claimed to be excellent. Provides simultaneous measurement of 18 of the 36 elements which the instrument is capable of measuring.

Baird-Atomic, Inc., Dept. PVP, 33 University Rd., Cambridge 38, Mass.

READ STANDARD

SPLIT-LEVEL MIXER
Greater Mixing Area

Now available is split-level mixer designed to handle high density, high viscosity chemical ingredients.

Mixer said to have 50 per cent additional effective mixing and heat transfer area. Available in 150, 350, 750 and 900-gallon sizes.

Also available is continous double arm mixer, built to provide homogeneous mixes of most materials, including those of high density or high viscosity.

Read Standard Division, Capitol Products Corp., Dept. PVP, York, Pa.

SUCCINIC ANHYDRIDE
Low Molecular Weight

Methyl succinic anhydride, low molecular weight solid, has been introduced in research quantities.

Product said to lengthen storage life of aliphatic or aromatic epoxy resin formulations. Permits mixing epoxy resin formulations at room temperature or slightly higher because of low melting point (37° C.).

As saturated acid anhydride, product will undergo most of usual anhydride chemical reactions, including hydrolysis, amidation, reduction, Friedel-Crafts reaction, Grignard reaction and esterification.

Eight-ounce samples available from Commercial Development Division, Chas. Pfizer & Co., Inc., Dept. PVP, 630 Flushing Ave., Brooklyn 6, N. Y.

SURFACTANTS
Non-Ionic

Series of non-ionic surfactants derived from castor oil. In these "Surfactol" products, castor oil has been modified by ethoxylation to four different stages so that in hydrophilic properties the products range from moderately self-emulsifiable to completely soluble in water.

Major applications include emulsifiers, emulsion paints, and solubilizers for dyes and oil extracts.

Possess defoaming properties and have very mild wetting action.

The Baker Castor Oil Co., Dept. PVP, 40 Avenue A, Bayonne, N. J.

T

TANK LEVEL DETECTOR
For Process Industries

AccuRay tank level detector-controller now available for the process industries.

Technological advances claimed to have lowered cost to that of conventional float-level controllers.

Said that no part of instrument extends into tank or vessel. Installed completely external to the tank making it free from fouling by process material and readily accessible for maintenance.

Used in either of two modes of operation. Can be installed so as to provide a relay closure signal when level rises above or falls below level of detector, and can be installed so that both a high and low level can be provided from one instrument. Accuracies available up to $\pm$ 1/16".

Radiation field required at detectors is low—only 0.2 mr/hr. Unique circuitry said to prevent chatter from radiation statistics.

Industrial Nucleonics Corp., Dept. PVP, 1205 Chesapeake Ave., Columbus 12, Ohio.

TEMPERATURE CONTROL
Improved Readability

Mercury-actuated indicating temperature control features novel dual mounting design and improved readability.

Model MFS, said to be accurate to within one-half per cent of scale range, is available in ten scale ranges. Controller senses, indicates and controls processes within —30 to 1100 degrees F.

PARTLOW

Readability feature called "Accu-vision" is designed into the instrument. Said to guarantee accuracy in setting and reading, and to virtually eliminate possibility of human error. Feature includes increased dial area, special magnifying setting pointer equipped with two hairlines for parallax sighting, and optically designed combination of dial colors for contrast.

The Partlow Corp., Dept. PVP, 506 Campion Rd., New Hartford, N. Y.

TEMPERATURE CONTROLLER
For Pneumatic Operators

A pneumatic recording temperature control, designed primarily for industrial process uses.

The control, a simple mercury-actuated mechanism utilizes no electricity and is particularly well adapted for use by process industries where a precise, explosion-proof, throttling-type control is required. The control utilizes a 15-pound air line to actuate an air-operated steam valve or other air operated device.

Available in any of 10 optional temperature ranges within the extremes of -30 to 1100 degrees F. It features a 10-inch circular chart and chart drives of 24 and 48 hour and 7-day in either spring drives

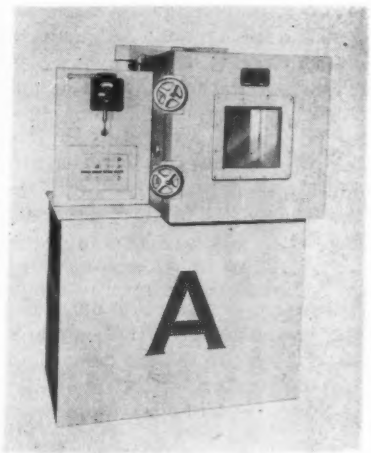
for explosion proof applications or electric drives, if desired.

Among its features are readily adjustable throttling range, 3 to 20% and a fail-safe provision, which shuts off the valve or device if there is any failure of air supply to the instrument. This eliminates any possibility of damage by the uncontrolled heating medium.

The instrument is actuated by a mercury-filled thermal element. The control varies the air pressure between the control and the air operated valve in direct proportion to temperature change. A rise in temperature at the point being controlled is sensed by the control which modulates the air pressure to the air operated valve. Depending heat has risen, the valve will restrict the supply of heating medium.

Accessories recommended for use with the control including an air filter, regulator, gages and an air operated diaphragm-valve are available as an optional package.

Partlow Corp., Dept. PVP, 509 Campion Road, New Hartford, N. Y.



ASSOCIATED TESTING

TEMPERATURE TEST CHAMBER

Cascade Refrigeration

New environmental test chamber for low-high temperature testing in the range of −100°F. to +800°F.

High efficiency of the Freon 13 - Freon 22 cascade type unit said to be seen by the high heat dissipation. Accuracy to within plus or minus 2°F.

Aircooled compressors said to assure ease of operation and blower motors are externally mounted for accesibility.

Working dimensions are 18″ x 18″ x 18″ (internal volume 3.4 cubic feet).

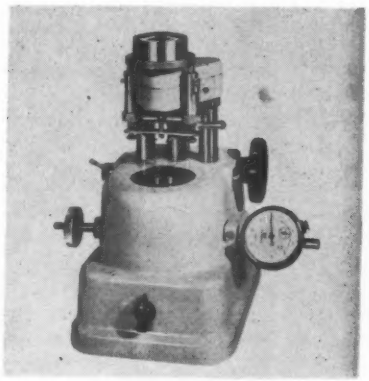
Associated Testing Laboratories, Inc., Dept. PVP, 112 Clinton Rd., Caldwell, N.J.

TESTING DEVICES

Measures Film Hardness

A device for the measuring of hardness of paint and other surface coatings has been made available.

Unit, known as Wallace Micro-Indentation Tester, Model H-7 measures depth of indentation while indentor still is under load, and permits studying of indentation as a function of time



TESTING MACHINES

Unit also permits measurement of degree of recovery shown by material after indenting load is moved. Accuracy said to be sufficiently high to permit measurements of small differences of hardness on paint films as thin as .0005″, and to show variations in hardness occurring over the surface of a single specimen.

Differences in hardness may be related do differences in the formulation of the material, and rate at which hardness develops can be studied in detail.

Testing Machines, Inc., Dept. PVP, 123 W. 64th St., New York, N. Y.

THERMOMETER

For Limited Space Areas

Thermometer called Model G has head diameter of 1-11/16 inches to ideally suit it for installation on any type of equipment where mounting space is limited.

Instrument is constructed on direct drive bi-metal coil principle, which eliminates gears and linkage. Constructed entirely of stainless steel, with easy to read aluminum and back crystal-protected dial. Instrument is moisture sealed, overheat protected, pressure proof and calibrated for peak accuracy, according to manufacturer.

Available in 11 ranges, Model G may be supplied with stem length from 2½ to 72 inches. W. C. Dillion & Co., Inc., Dept. PVP, 14620 Keswick St., Van Nuys, Calif.

TWO-LINE PISTON FILLER

Many Features

Model 15NH2 said to be completely new, low cost two-line piston filler.

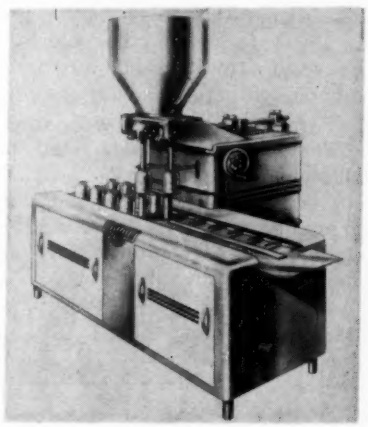
Designed to handle liquid, semi-viscous products, the model described as being extremely flexible and easy to operate.

Features include adjustable head height and a rising table provides "bottom up fill" with table height being simply adjusted.

Each filling line has "no container—no fill" divice. New diagonal filling position said to give handling advantages and conserve space.

Model also has variable speed drive, speeds ranging from 15 to 30 cycles.

Filling range reported as ¼ oz.



HOPE

to a gallon. Filling speeds vary from 10 to 60 or more containers per minute.

Hope Machine Co., Dept. PVP, 9400 State Road, Philadelphia 14, Pa.

U

MELAMINE RESIN
For Use in Baking Enamels

Melamine formaldehyde resin, Uformite MM-57, said to provide exceptional gloss and speed of cure in baking enamels.

Other properties include: very good hardness and mar resistance, excellent color and color retention and good soap and alkali resistance.

Rohm & Haas Co., Dept. PVP, Washington Sq., Philadelphia 5, Pa.

ULTRAVIOLET ABSORBER
Protects Against Damaging

UV 9 Ultraviolet Absorber protects many products from discoloring, fading, brittling, and other damage caused by exposure to the invisible ultraviolet portion of natural or fluorescent light.

Provides ultraviolet-light stability to materials by absorbing or soaking up harmful ultraviolet light and transforming it into harmless radiation.

American Cyanamid Co., Organic Chemicals Division, Dept. PVP, 30 Rockefeller Plaza, New York 20, N.Y.

UNIVERSAL VEHICLE
For Tinting Paints

Uneek, a universal vehicle for tinting colors. Claimed that dry colors can be dispersed very easily in Uneek to yield a paste which is outstanding for tinting house paints, alkyds, synthetics, and latex paints.

Pastes made with Uneek, when used for tinting paints, said to show excellent stability; no floating or flooding, easy handling, no skinning with no effect on dry, and rapid and thorough development of color in paint systems.

Farnow, Inc., Dept. PVP, 4-83 48th Ave., Long Island City 1, N. Y.

V

VACUUM DRYER
Internal Volume of 500 cu. ft.

Large capacity Rota-Cone Vacuum Dryers. Two units available have inside diameter of 10′ and an internal volume of 500 cu. ft. Each dryer weighs more than 13 tons and has been designed to handle a batch of 12,500 lbs. of material at one time.

Completely jacketed, each dryer is heated by means of a hot fluid introduced into the jacket by a 4″ diameter syphon type rotary union.

Revolves in heavy duty roller bearings, mounted on steel supporting stands which provide swing clearance under the discharge valve.

Driven by a 40 HP gearmotor, and a machine-cut guarded gear and pinion.

Capable of removing up to one-ton of moisture per hour from the batch, and vacuums as high as 10 m.m. of mercury absolute pressure can be obtained. Temperature of the batch can be measured at all times.

Paul O. Abbé, Dept. PVP, 239 Center Ave., Little Falls, N. J.

RELIANCE

VERTICAL MOTORS
To 40 Horsepower

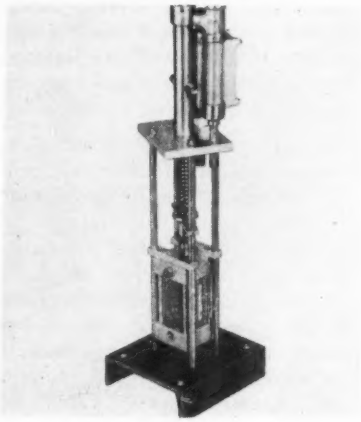
Vertical solid shaft, high-thrust P-base motor in sizes for 1 to 40 horsepower has been introduced.

Designed for direct mounting on high-thrust pumps, motor said to be available in all standard enclosures: protected; totally-enclosed, fan-cooled; and explosion proof.

Upper thrust bearing in units of 20 horsepower and up is oil-lubricated. "Bonnet" design of all-weather splash cover permits the "stacking" of additional bearings to continuously absorb high up-and-down thrust loads.

Available in all standard speeds up to 3600 rpm. Cast iron external construction. Corrosion-proof materials throughout internal construction. Explosion-proof motor of "dual-label" design.

Reliance Electric and Engineering Co., Dept. PVP, 24701 Euclid Ave., Cleveland 17, Ohio.



NORCROSS

VISCOMETER
Pipe Line Applications

New Viscometer Measuring element model M14 for general pipe line applications.

Element can be installed in the line or in a side stream to measure the viscosity under the actual pressure and temperature conditions of the system. A piston is intermittently raised by an air cylinder and then allowed to fall by gravity. The time required for the piston to fall a given distance is a measure of viscosity and a proximity switch is used for the timing. The viscosity time signals are electrically transmitted for recording and/or controlling.

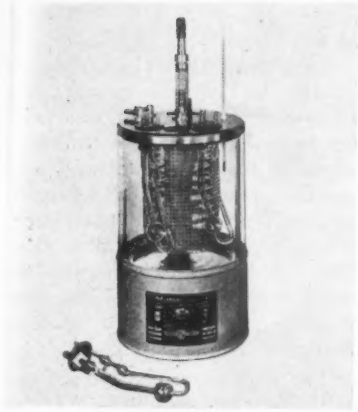
Provision is made for measuring the temperature of the sample so that corrections can be made for temperature variations.

Norcross Corporation, Dept. #N47, Dept. PVP, Newton 58, Mass.

VISCOSITY BATH
Wide Range

Temp-Trol Kinematic Viscosity Bath provides ±0.02°F. uniformity and is said to allow completely accurate Kinematic viscosity determinations of Newtonian liquids at minimum cost.

Unit said to eliminate previously required mixture of general purpose baths and partially acceptable accessories. Meets specifi-



PRECISION

cations of ASTMD-445 and Federal Test Standard No. 791 Method 305.3.

Also said to accommodate any modified Ostwald, Ubbelohde or S.I.L. suspended level viscometer. Has wide range measurement, including viscosities of 0.4 to 16,000 centistokes. Provides below room temperature when desired.

Precision Scientific Co., Dept. PVP, 3737 W. Cortland St., Chicago, Ill.

VOLUME PUMPS
Minimum Working Parts

New Milroyal line of controlled volume pumps for the chemical processing industries are now in production.

One design objective realized in the new Milroyal controlled volume pumps is the use of a minimum of working parts and bearing surfaces to translate high speed rotary motion to low speed reciprocating motion. Totally enclosed, this speed reducer is an integral part of the pumps and runs in an oil bath. This combined Polar-Crank drive unit and speed reducer permits manual or automatic adjustment of capacity from 0 to 100 percent. The capacity adjustment closely approximates a liner relationship and can be made while the pump is running.

Plunger of a Milroyal controlled volume pump always returns to the same forward position on each stroke regardless of stroke length to ensure maximum displacement efficiency.

Using standard speed motors, several of these controlled volume pumps can be coupled to a single motor yet each pump will have its individual capacity adjustment. The primary application for the Milroyal controlled volume pumps will be in the processing fields where chemicals must be metered accurately but dirty or corrosive atmospheres quickly damage less rugged equipment.

With liquid ends constructed of alloy steels for corrosion resistance, these pumps have maximum capacities to 29 gallons per hour and will meter against pressures to 1900 psi.

Milton Roy Co., Dept. PVP, 1300 E. Mermaid Lane, Philadelphia 18, Pa.

W

WALKIE TRUCK
Operates in Minimum Space

High stacking loads in minimum aisle space claimed to be possible with compact, counterbalanced-type JackStacker "walkie" truck.

This truck, which has a 1000-pound capacity, has an overall length of just 63 ¾ inches with a 24-inch long load. The truck will maneuver and high stack goods in aisles as little as 5-feet, 10-inches wide with a 24-inch long load, extremely narrow for a counterbalanced-type truck.

Especially recommended for situations where operating space is at a premium yet where the features of a counterbalanced-type truck are desirable, the truck is lubricated-for-life, eliminating all periodic lubrications.

It is operated from a control handle while walking along with it, thus its designation as a "walkie" truck. All controls, including brake, traction, lifting lower and tilting, are centrally located in the handle.

Lewis-Shepard Products, Inc., Dept. R8-21, Dept. PVP, 125 Walnut St., Watertown 72, Mass.

WASHABILITY MACHINE
Chain-Drive Mechanism

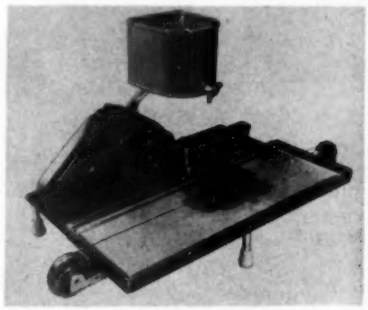
Instrument designed for measuring the washability, scrubbability, cleansability, removability and abrasion resistance of such products as paints, varnishes and lacquers has been made available.

Drive mechanism located on underside of machine. Driving parts fabricated from aluminum castings.

Panels of any desired type may be used. Dimensions of the plate are 18″ long x 13″ x ¼″ thick.

In addition to brush and brush box, other accessories are available.

Gardner Laboratories, Inc. Dept. PVP, Bethesda 14, Md.



GARDNER

WATER-SOLUBLE POLYMER
Thickening, Suspending, Dispersing

Fluffy white powder, Carbopol, described as the first of a family of polymers which is said to be the most versatile agent ever discovered for thickening, suspending, dispersing and emulsifying.

Carbopol is non-toxic and is relatively unaffected by temperature and aging.

Specific advantages imparted to products by the addition of Carbopol include: the improvement of color values and flow properties in printing inks; stabilizing emulsions and suspending abrasives in waxes and polishes; improving the flow of textured paints by setting up a resistance to running and dripping; and preventing the clogging of nozzles in spray applications.

Carbopol can eliminate the "shake well before using" requirement for virtually every product normally needing that label, it is claimed.

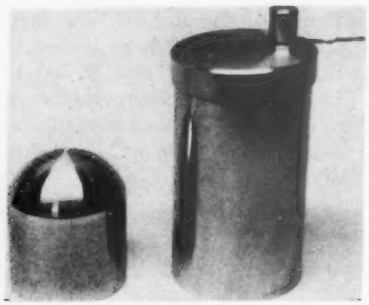
B. F. Goodrich Chemical Co., Dept. PVP, 800 Second Ave., New York 17, N. Y.

WEIGHT PER GALLON CUP
For Beaded Traffic Paints

Special weight per gallon cup designed to measure the weight per gallon of beaded traffic paints.

The inherent draw-back of the

tendency of the beads to score the sidewall of regular cups has been eliminated.



GARDNER

Dimensions are 3 5/8″ high with plunger inserted and 2″ in diameter.

Capacity is 83.2 g. water at 77°F.

Aluminum bullet-shaped tare-weight shown is designed for safe storage in the cup when not in use.

Gardner Laboratory Inc., Dept. PVP, P. O. Box 5728, Bethesda 14, Md.

X

XYLENE COMPOUNDS
Chlorinated

Three new chlorinated xylene compounds available.

One of these new products is derived from p-xylene, while the other two are m-xylene derivatives.

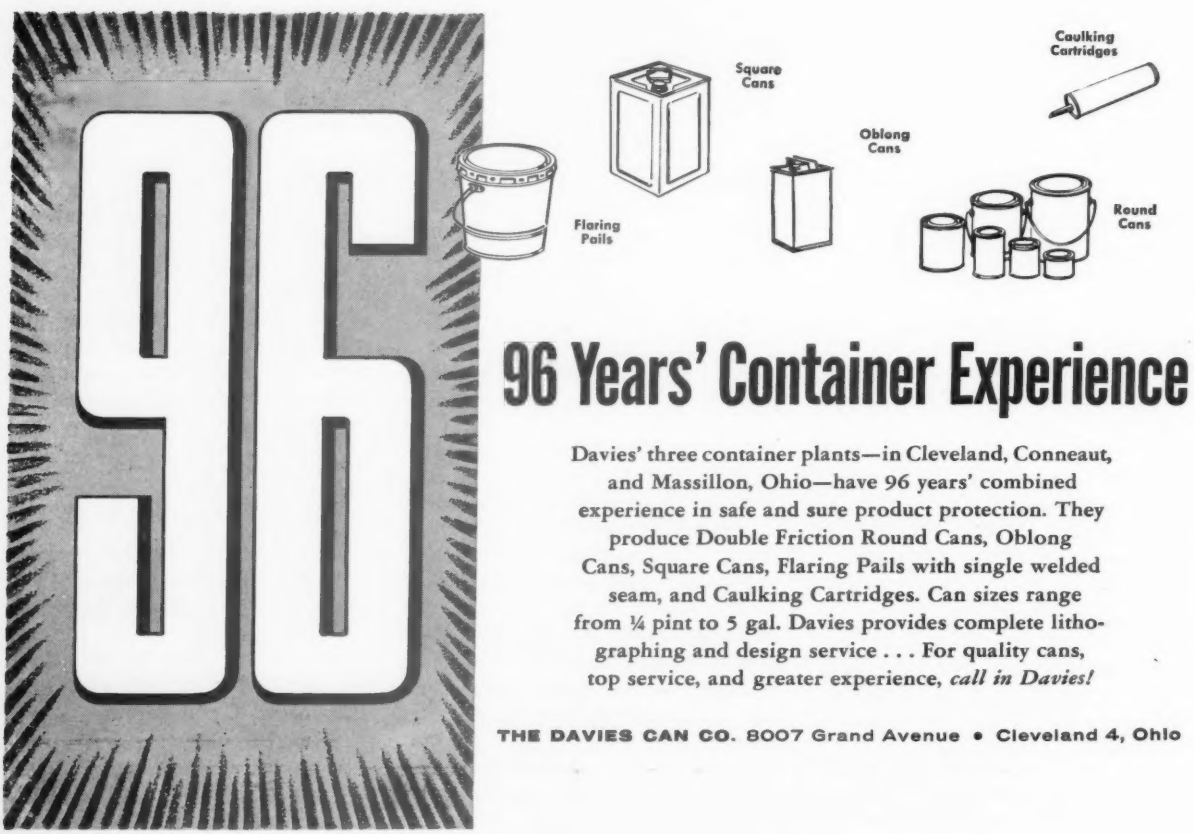
The new products are terephthaloyl chloride, a derivative of γ, γ'-hexachloro-p-xylene, γ, γ'-hexachloro-m-xylene, and its derivative isophthaloyl chloride.

All three of these chemicals represent interesting possibilities as intermediates for a variety of end-products. γ, γ'-hexachloro-m-xylene hydrolyzes to isophthatlic acid, forms isophthalic esters through alcoholysis, and can be halogenated in the ring.

Both terephthaloyl chloride and isophthaloyl chloride can be reduced to dialdehydes and dibasic acids, can be oxidized to acids, and can be esterified easily with alcohols. They react readily with ammonia, amines, and amino compounds. These acid chlorides will undergo the Friedel-Crafts reaction, will react with organic sodium compounds, with Grignard reagents, and can be chlorinated.

The high reactivity of the terephthaloyl and isophthaloyl chlorides makes them especially interesting as raw materials for interfacial polycondensation for preparation of polyamides and polyphenylesters.

Diamond Alkali Co., Product Development Department, Dept. PVP, Research Center, Painesville, Ohio.


96
Caulking Cartridges
Square Cans
Oblong Cans
Round Cans
Flaring Pails
96 Years' Container Experience
Davies' three container plants—in Cleveland, Conneaut, and Massillon, Ohio—have 96 years' combined experience in safe and sure product protection. They produce Double Friction Round Cans, Oblong Cans, Square Cans, Flaring Pails with single welded seam, and Caulking Cartridges. Can sizes range from ¼ pint to 5 gal. Davies provides complete lithographing and design service . . . For quality cans, top service, and greater experience, call in Davies!
THE DAVIES CAN CO. 8007 Grand Avenue • Cleveland 4, Ohio

NOW . . . a strong COMPETITIVE ADVANTAGE for paint manufacturers!

DIANOL*

. . . adds a 3rd. dimension to ALL PAINTS

PROTECTION

DECORATION

EXTERMINATION

Paint is used for protection and decoration! *Now* . . . DIANOL adds a *3rd* use: *extermination*. For DIANOL kills *all* household bugs on contact. Guarantees bug-free surfaces for the life of the paint!

DIANOL is an insecticide additive containing DIANOL'S wonder ingredient, D-3, one of the *most potent* but SAFE insect-killers known!

DIANOL mixes with ANY type paint regardless of base . . . does not affect the color, consistency or quality. DIANOL is safe . . . harmless to people and pets when used as directed! Tested and proved for over 8 years by hotels, restaurants, hospitals and schools.

It offers *a great competitive* advantage to you, *the manufacturer* . . . all household and institutional *bug-fighters* are your market. It's a huge $$$$ potential!

Let us tell you more about this new additive now being offered to all paint users from homes to institutions . . . for crawling, flying and sucking insects.

* For full processing facts, write the DIANOL DIVISION, Mills-Pearson Corporation 2621 24th Street North St. Petersburg, Florida

DIANOL* PAINT INSECTICIDE

* certified by U. S. Testing Corp.

ELIMINATES INSECTS FOR THE LIFE OF THE PAINT

PIGMENTS

Finest finishes need the color appeal provided by Glidden pigments. Zopaque titanium dioxide disperses more readily, imparts greater whiteness. Cadmolith and Mercadmolith colors are non-fading, non-bleeding – offer advantages found in no other reds and yellows. Use Glidden pigments to make your products stand out at the point of sale.

QUALITY Glidden PRODUCTS

FINEST PIGMENTS FOR INDUSTRY

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World Wide REVIEW OF 1958

Thirty-One Publications Covered

Comprises Over 550 References

Detergent test tells the truth about Baked Enamels

The whole story is right in the picture. Both panels were sprayed with white enamel and baked. One enamel is now in wide commercial use for home appliances. The other is a similar formulation with just one difference . . . UFORMITE MX-61 triazine formaldehyde resin by Rohm & Haas.

And now, after 16 hours in 165° F. 1% detergent solution, it's plain that UFORMITE MX-61 gives enamels superior resistance to detergents and soaps.

But advantages don't end there. UFORMITE MX-61 also gives enamels excellent resistance to heat, high gloss, and exceptional adhesion. The low viscosity of UFORMITE MX-61 permits formulating high solids, one-coat enamels.

It's easy to use UFORMITE MX-61. It is compatible with a wide range of Duraplex alkyd resins and other film formers. Write today for a guide to the many uses of UFORMITE MX-61, and technical data on the 16 UFORMITE grades now available.

Chemicals for Industry

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

UFORMITE is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.

UFORMITE MX-61

PUBLICATIONS

Below are the principal journals used in abstracting items which appear in this Review. Where abstract sources such as Chemical Abstracts have been used, the abbreviations are those employed by the source itself.

Abbreviations	*Full Title*
Aerosol Age	
Amer. Paint Jl.	American Paint Journal
Anal. Chem.	Analytical Chemistry
Bull., Amer. Soc. Test. Mats.	Bulletin of the American Society for Testing Materials
Can. Paint & Varn.	Canadian Paint & Varnish
Chem. Abst.	Chemical Abstracts
Chem. Eng.	Chemical Engineering
Chem. & Ind.	Chemistry & Industry
Chem. in Canada	Chemistry in Canada
Corr.	Corrosion
Corr. Prev. & Control	Corrosion Prevention & Control
Corr. Tech.	Corrosion Technology
Fact. Man. Maint.	Factory Management & Maintenance
Farbe und Lack	
Ind. Eng. Chem.	Industrial & Engineering Chemistry
Ind. Finishing	Industrial Finishing
Jl. Amer. Oil Chem. Soc.	Journal of the American Oil Chemists' Society
Jl. Electrochem. Soc.	Journal of the Electrochemical Society
Jl. Oil Col. Chem. Assn.	Journal of the Oil & Colour Chemists' Association
Jl. Polymer Sci.	Journal of Polymer Science
Makromol. Chemie	Makromolekulare Chemie
Met. Finishing	Metal Finishing
Off. Digest	Official Digest of the Federation of Paint and Varnish Production Clubs
Oil, Paint & Chem. Rev.	Oil, Paint & Chemical Review
Paint Ind.	Paint Industry Magazine
Paint Mfr.	Paint Manufacture
Paint Tech.	Paint Technology
Paint & Varn. Prod.	Paint & Varnish Production
Prod. Finishing	Products Finishing
Prod. Eng.	Product Engineering
Soap Chem. Spec.	Soap and Chemical Specialties

New

LOW-COST FORMULATIONS BROADEN YOUR MARKETS

Marbon's 9200 resins can be a vital factor in helping you produce *superior* paints and lacquers at *lower* costs! Only Marbon's 9200 resins offer you so many *basic* benefits — enable you to produce multicolor paints and lacquers for diversified applications.

To broaden your markets — to increase your profits — try Marbon's 9200 resins for *your* multicolor paints and lacquers!

- REDUCES PREMIUMS FOR EXPLOSION-PROOF EQUIPMENT
- LOW-COST FORMULATIONS
- PERMITS USE OF LOW-ODOR PAINT SOLVENTS
- GOOD CHEMICAL RESISTANCE
- LOW ODOR LEVEL
- QUICK DRYING
- GOOD CAN STABILITY

WRITE TODAY FOR ACTUAL SWATCH AND LATEST TECHNICAL INFORMATION

PACESETTER IN

Marbon CHEMICAL

SYNTHETIC RESINS

DIVISION of BORG-WARNER
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Marbon

SYNTHETIC RESINS

UNDOUBTEDLY the most important development in 1958 and one that attracted considerable attention was the availability of water-soluble resins for industrial application such as metal primers and gloss finishes. Such water-soluble systems may be air-dried or baked in the presence of driers, resulting in a water-insoluble film. Interest in this development stems largely from the fact that such finishes are free of odor and flammability hazard which are important considerations in industrial work because of the trend toward greater fume control and safety practices. In this connection, alkyd emulsion systems for industrial application also created wide spread interest among fabricators of metal products.

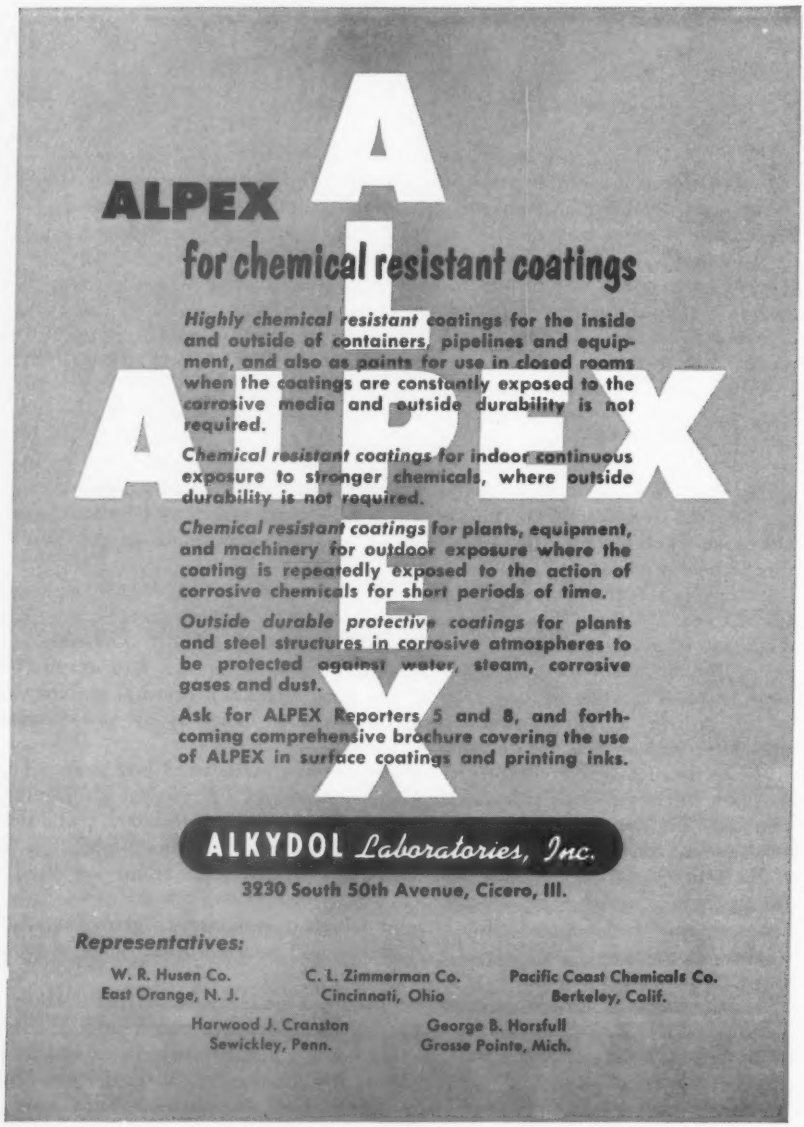
Another significant development in 1958 was the growing interest in solventless coatings. The three major types of solventless coatings are polyurethanes, epoxies and polyesters. Advantages of such coatings are no solvent cost; they comprise of solids only; both freight and package savings can be substantial; application costs will be lower since only one coat is usually required; no toxicological or safety hazards due to solvent; film properties are more firmly under the control of the chemists; and most important, solventless coatings are well adapted to machine or mechanical application.

Extensive research and product development took place in the field of silicone resins last year. Among these were a silicone intermediate to prepare silicone-alkyds and silicone-epoxy resins; a process for making epoxy resins with a silicone backbone; a silicone resin for cold blending with alkyd, melamine, and acrylic type baking enamels to give improved color and gloss retention, thermal stability and resistance to weathering; a silicone resin which can be baked as low as 350 degrees F. and still produce excellent degree of hardness.

A new form of epoxy known as diepoxides was introduced last year. These diepoxides will react with anhydrides to produce epoxy materials for various applications. They have a molecular weight varying from 358 to 9,000. The liquid resins have molecular weights below 1,000 and are used for laminates, castings, and electrical encapsulation. The higher molecular weight solid resins are used for coatings applications.

Epoxy modified nitrocellulose lacquer which is resistant to ultraviolet light, has excellent adhesion, flexibility and hardness, and resists a wide range of solvent and chemicals was announced in 1958.

Another development which deserves mention is the use of sucrose acetate isobutyrate (SAIB) in nitrocellulose lacquers. When incorporated into a coating formulation the behavior of this sugar derivative is intermediate between a resin and plasticizer. In lacquers, SAIB, because of its low solution viscosity, permits higher non-volatile content without exceeding application viscosities. Film hardness does not decrease with SAIB modification, and improvement in adhesion has been claimed.


ALPEX
for chemical resistant coatings
Highly chemical resistant coatings for the inside and outside of containers, pipelines and equipment, and also as paints for use in closed rooms when the coatings are constantly exposed to the corrosive media and outside durability is not required.
Chemical resistant coatings for indoor continuous exposure to stronger chemicals, where outside durability is not required.
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Outside durable protective coatings for plants and steel structures in corrosive atmospheres to be protected against water, steam, corrosive gases and dust.
Ask for ALPEX Reporters 5 and 8, and forthcoming comprehensive brochure covering the use of ALPEX in surface coatings and printing inks.
ALKYDOL Laboratories, Inc.
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C. L. Zimmerman Co. Cincinnati, Ohio
Pacific Coast Chemicals Co. Berkeley, Calif.
Harwood J. Cranston Sewickley, Penn.
George B. Horsfall Grosse Pointe, Mich.

Review Articles

A number of reviews covering recent developments in the paint and varnish fields were published during 1958. Several of these were detailed, dealing with every aspect of the subject; others were limited in scope. The citations below are devoted to the entire industry: research developments, statistical analyses and forecasts, summaries of basic chemistry and production methods, patents, etc. Articles reviewing particular fields—such as that of isocyanate resins—will be noted further on, under their specific subjects.

The "Review and Buyers' Guide Issue" of PAINT AND VARNISH PRODUCTION. February, 1958, edited by Dr. S. Chibnik, was an extensive survey of the literature of 1957, covering developments in synthetic resins, latex emulsions, solvents, pigments, drying oils and derivatives, intermediates, additives, production, chemistry, analysis and testing, and finishes and application.[1] The issue cites hundreds of articles and patents.

An exhaustive series by Brushwell covers the paint industry in 1957.[2] This very detailed review, based upon a critical analysis of the literature of the field, deals with research developments, new products, processing and marketing.

A chapter in "Reports on the Progress of Applied Chemistry", published by the Society of Chemical Industry, London, reports advances in natural and synthetic resins, drying oils and fatty acids, pigments and paints during 1957. Compiled by members of the Oil and Colour Chemists' Association, it is the most complete survey of its kind published in England; its coverage, however, is world-wide.[3]

Among the less detailed reviews of the field, those of Alexander[4], Burrell[5], and McSweeney and Kropa[6] should be mentioned. The first of these is a broad evaluative analysis of progress in the last few decades, dealing with vehicles, pigments, and various resins. Burrell's article deals with protective coatings, that of McSweeney and Kropa with plastics and resins. A brief survey by Marino[7] covers organic finishing developments in 1957. Weaver discusses new developments in surface coatings; he forecasts that styrene, because of its versatility, will become the chief modifier for paint vehicles in the years ahead[8].

Two comprehensive series dealing with the fundamentals of paint production and materials are those of Beck[9], which appeared in a number of issues of *Metal Finishing*, and the six articles, "Petrochemicals for paint", which were published in PAINT AND VARNISH PRODUCTION.[10] Beck's review considers pigments and additives, and is based upon wide practical experience and a survey of pertinent literature. The "Petrochemicals" series deals with basic definitions, chemical processes, the various kinds of resins, their chemistry and application, solvents, pigments, and such miscellaneous products as driers, glycerol and pentaerythritol. A brief report by Grossman covers the ingredients and processing of organic coatings[11]. Vern writes about the production of gum naval stores, pointing out that while the industry has been in decline for several years, this trend may be reversible; he advocates improved methods of production and a stress upon research.[12]

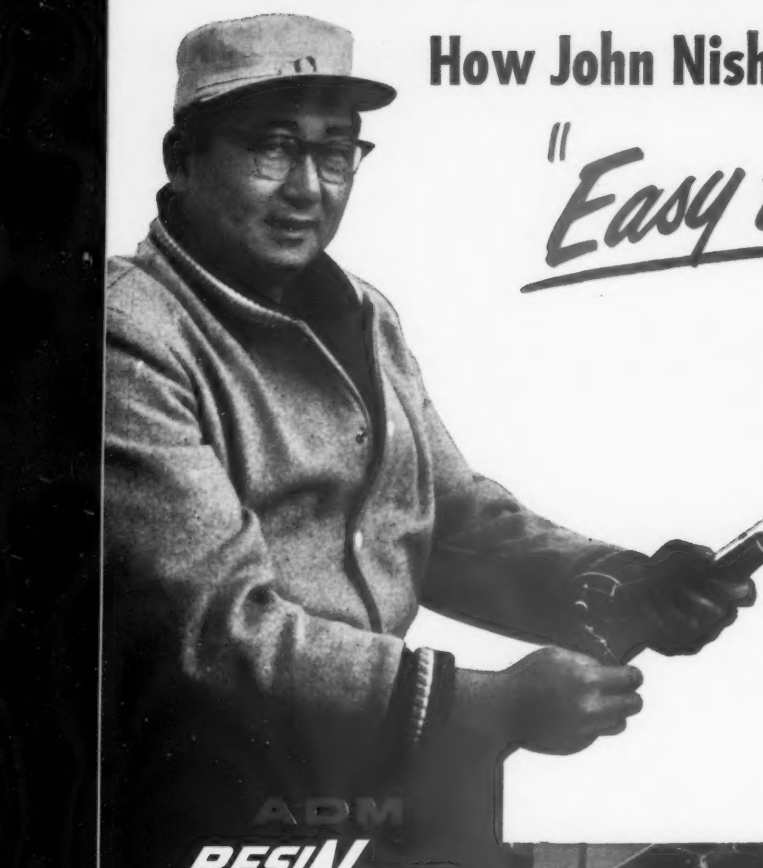
An interesting statistical analysis made by the American Can Company predicted that the United States would use 335,000,000 gallons of trade paint in 1961—a 7% increase over 1956 use, and almost 26% higher than the average for 1947-1949. "Trade paint" is paint, varnish and lacquer sold directly to consumers and jobbers through retail and wholesale outlets, and does not include industrial paints sold in bulk. The expected increased in sales is based upon a shortening of the repainting cycle, as a result of rising consumer income and the popularity of easy-to-use coatings; moreover, new home construction will be reflected in increased demand for trade paints. The prediction is that 90% of the 1961 market will be for repainting, and 10% for new construction.[13]

The question of changing standards of performance is discussed by Rochow.[14] In a broad, historical approach to some of the problems of the coatings industry, he urges the long-range view, rather than one dealing constantly in expedients. He reviews efforts to produce more durable coatings and treats inorganic polymers, "flexible" ceramics, silicone polymers and silicone-organic compounds.

Several articles dealing with the chemistry of polymers should be noted. Bobalek reviews recent work on the problem of "tailor-making of molecules which have mechanical and chemical properties exactly suited to an intended commercial application", discussing intermolecular attractive forces, tendency to crystallize, and copolymerization.[15] The same author writes of the role of polyethers, polyamides and polymethanes in modern paint formulation[15a], and of recent advances in the theory of polymer mixtures[15b]. The polymer chemistry of coating compositions is the subject of a series by Hundert.[16] He describes vinyl polymerization, addition and condensation polymerization, plasticization and copolymerization. Biele and Facius discuss the significance of aqueous dispersion for the producer and manufacturer of varnishes.[16a] They review types of dispersions, film formation, and determination of aqueous dispersions and their additives applied for varnishing.

Developments abroad are described in a number of sources. Hargrave covers the organic protective coatings industry in Canada.[17] A series of patent reviews in *Paint Technology* covers British advances in color and synthetic resins and derivatives.[18-20] An article in *Farbe und Lack* deals with new products and intermediate materials in Germany: pigments, dyestuffs, extenders, binders, solvents; methods of testing; processing machinery and equipment.[21] Developments in the Soviet Union are the subject of a number of reviews and abstracts. Kazin discusses coatings and application methods now being used or planned in Russia.[22] Soviet polymer research targets are outlined in an article in PAINT AND VARNISH PRODUCTION; in 1965, the USSR plans to manufacture eight times more plastics and resins than it did in 1957, if objectives of the coming six-year plan are met. Although no detailed directives or plans are known to have been

How John Nishiyama Makes ADM "Easy to Buy from"



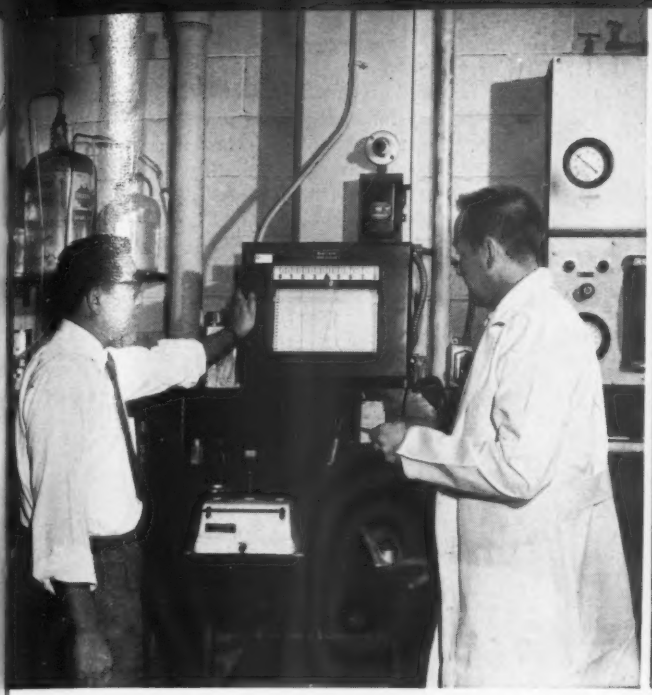
ADM RESINEWS

Weekends when the albacore are running, John Nishiyama likes to try his luck angling the deep, blue waters off Catalina Island. It's a great sport, and a perfect change of pace for the busy superintendent of ADM's Los Angeles resin plant.

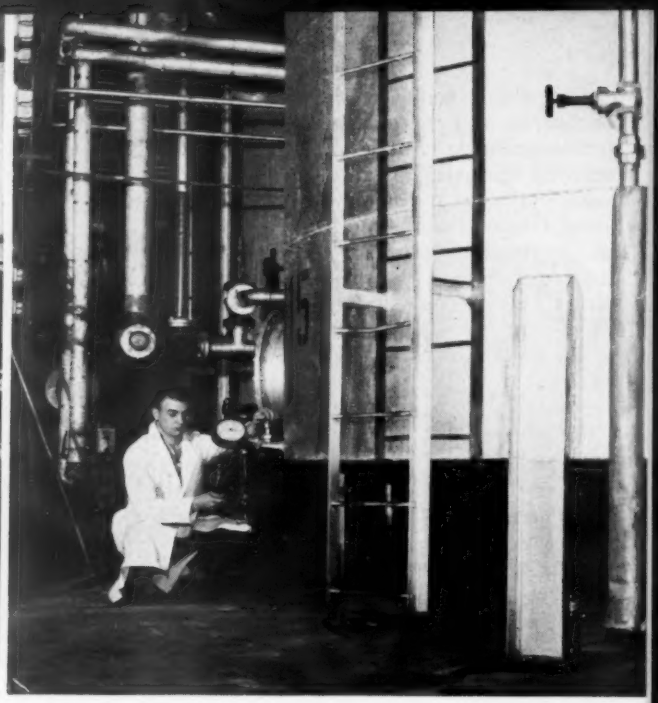
On his job, luck is strictly taboo. Producing the complete line of ADM resins to meet rigid specifications is a big responsibility . . . requires pin-point precision, clock-work timing. Even with the latest electronic control equipment, it calls for all the skill, training, and concentration a man can muster.

John is tall in these traits, as are all the men in ADM's six resin plants. Aside from deep sea fishing since age seven, his background includes college, two years soldiering during World War II, and six years' quality control work before transferring to production in 1955. He's well qualified to tell about ADM production . . .

❸ "With an okay from the control lab, a perfect balance of ingredients—so critical to the finished product—is achieved by carefully metering or weighing raw materials into the electronically controlled reactors. We are equipped to make resins, polyesters, copolymers and polymers. As each batch is processed, filtered, adjusted to specs, and finally pumped into kitchen-clean containers, testing is continuous to maintain full control over quality.



❶ "Our particular magic is Full Control. Constant plotting of data obtained from electronic instruments and from frequent 'kettle' test samples give us a true running picture of what's happening . . . absolute control during the entire production cycle.



❷ "Full Control starts with raw materials. Before we pump a drop in or out of these bulk tanks, control chemists make certain it meets our rigid specifications. Control is our conscience, and a tough one, too! Incidentally, these bulk tanks enable ADM to buy premium grade raw material in volume . . . thus insuring extra quality products.

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made public, some preliminary conclusions can be drawn from statements made in major Russian technical journals.[23] Another discussion of paint technology in the Soviet Union, and abstracts covering the Russian, Czech and Polish literature were also published in PAINT AND VARNISH PRODUCTION.[24-26] A report by Sarin is devoted to progress in India: the outpur of the paint industry, the use made of indigenous raw materials, research programs and facilities are described.[27]

Literature reviews devoted to thermoplastic and thermosetting resins were published in the English journal, *Paint Manufacture*.[28-29]

A very useful article by Hammond deals with the problem of paint terminology in French and German. Hammond emphasizes the importance of an exact and idiomatic translation of foreign terms, and gives some helpful hints.[30]

Acrylics

The chemistry, properties, uses and methods of application of acrylic coatings from organic solutions are covered in a detailed review article by Allyn.[31]

Venkatakrishnan and Santappa describe a study of the kinetics of vinyl polymerization (using methyl acrylate as monomer), initiated by ceric ions in perchloric acid solution, with respect to ceric and monomer disappearance, over–all rate, and influence of pH. The dependence of ceric and monomer concentrations with reference to ceric disappearance was found to be of the first order. Based on the latter, and on the one-half order for ceric concentration and 3/2 power for monomer concentration for the over-all rate, a probable mechanism for the initation reaction has been proposed, assuming a reaction between Ce^{4+}-ion and monomer resulting in the production of free radicals. The same equations can be written for ceric and monomer disappearance in the reaction in nitric acid (instead of perchloric acid) medium.[32]

Patents

A step in the process of finishing wood surfaces which comprises applying to the surface an aqueous emulsion of a methyl methacrylate resin containing about 35% by weight of resin and from 0.2 to 2.85% by weight of borax, and then drying, is the subject of a patent by Eastland.[33]

Compositions comprising acrylonitrile polymers are the basis of a patent to several assignors to the Japanese firm, Asahi Kasei Kogyo Kabushiki Kaisha, Osaka. The patent covers a new composition of matter comprising a polymer of acrylonitrile containing in the polymer molecule at least 85% by weight of acrylonitrile and a compound taken from the class consisting of benzoyl dimethylamide and phthaloyl tetramethyldiamide.[34]

A United States patent granted to H. W. Godshalk covers a pigmented coating composition which produces a dry coating characterized by uniform pigment dispersion and by absence of pigment flooding and mottling, comprising a polymer of methyl methacrylate as the preponderant film-forming material, volatile solvent, plasticizer, pigment and about 0.1-10% by weight, based on the total weight of nonvolatile constituents in the coating compound, of a cellulose ester selected from the group consisting of cellulose nitrate, cellulose propionate, cellulose butyrate, cellulose acetate butyrate, cellulose acetate propionate, and mixtures thereof, the polymer of methyl methacrylate being at least one material of the group consisting of homopolymers of methyl methacrylate and copolymers of methyl methacrylate with from 2 to 25% by weight of a member of the group consisting of acrylic acid, methacrylic acid, a 1 to 4 carbon alkyl ester of acrylic acid, a 2 to 4 carbon alkyl ester of methacrylic acid, vinyl acetate, acrylonitrile and styrene; and the polymer of methyl methacrylate being further characterized by having a relative viscosity of about 1.117 to 1.196.[35]

Alkyds

Two articles in *Paint Manufacture* review the recent literature of alkyds and polyesters.[36] Sayre discusses the applications of alkyd resins in various coatings, with emphasis upon the market picture.[37]

Alkyd architecture is the subject of a study by Brett.[38] This surveys present knowledge of structure and characteristics of oil-modified alkyd resins, as well as solvent fractionation of these resins. In addition, some structural variations introduced into the alkyd system by use of different polyhydric alcohols are described, and their effect on the film properties of the final resin is examined. The article discusses alkyd reaction—in particular, reactions other than polyesterification which might be involved in building up polymer structure; the fractionation of alkyds by solvent precipitation and extraction techniques; and the preparation of alkyds of widely differing structural characteristics.

In an article on the kinetics and mechanism of alkyd photooxidation, Miller points out that while suitability of paints for outdoor use depends on the extent of oxidation, yet methods for measuring this reaction have been so far only largely empirical; his study presents optical techniques for more accurate kinetic analysis of the photodegradation process. This is described quantitatively as a "function of intensity and wave length of light and of the film thickness of the sample". The method described measures changes in visible reflection spectra.[39]

Vaughan and Schmitt discuss the chemical mathematics of phthalic alkyd resins.[40] They describe formulation and computation for a PE alkyd based on fatty acids and for oil-modified alkyds made by alcoholysis, with citations of particular examples. The actual log of a trial batch of a 62.5% soybean oil modified resin, using Hercules Improved Technical PE as the sole polyol, with a 0.05% litharge based on the oil added as alcoholysis catalyst, is given.

In a discussion of the Carothers equation for mathematically expressing the conditions of condensation polymerization, Carmody points out that the equation as stated does not consider deviations from ideal polymerization conditions, and that practical alkyd formulations vary from these ideal conditions because of a variety of reactions which compete with those involved in Carothers' study. Carmody suggests a correction factor which may be used to extend the usefulness of the Carothers equation. Application of this factor

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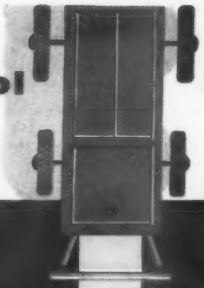

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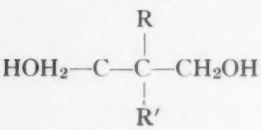
makes possible the formulation of any alkyd system with a mathematical certainty of success. It seems possible that the correction factor may have wide application.[41]

The relationship between chemical composition and formulation properties of alkyd resins is the subject of an article by Bobalek.[42]

Patents

A United States patent to Petropoulos and Cadwell covers a composition of matter comprising a mixture of from 70 to 30 parts of (1) an alkyd resin comprising the heat reaction product of a member selected from the group consisting of phthalic acid and phthalic anhydride with a polyhydric alcohol having the formula:



wherein R is a member of the group consisting of a—CH_2OH group, an alkyd group and an aryl group, R' is a member of the group consisting of alkyd and aryl groups, wherein the number of carbon atoms in R and R' totals at least 6, and correspondingly from 30 to 70 parts of (2) a thermosetting aminoplast resin.[43]

United States patent 2,861,047 covers the method of making an alkyd resin comprising reacting at a temperature in the range of about 150-250°C a long-chain fatty acid obtained from an oil selected from the group consisting of drying oils, semi-drying oils, nondrying oils, and mixtures thereof with pentaerythritol in the ratio of about 1.3 to about 3 equivalents of pentaerythritol to form fatty acid-pentaerythritol diester, dissolving in the diester, at a temperature in the range of about 220-260°C, about 0.5-1.5 equivalents of isophthalic acid, and reacting with the resulting product about 0.3-2.5 equivalents of the long chain fatty acid.[44]

An alkyd-nitrocellulose coating is the subject of a United States patent.[44a] This is a liquid coating composition comprising pigment, volatile organic solvent and organic film–forming material consisting materially of (1) a butyl methacrylate-alkyd resin copolymer containing, in each 100 parts by weight, (a) 20-60 parts by weight of butyl methacrylate and (b) 80-40 parts by weight of a phthalic glyceride alkyd resin having an acid number less than 10 and containing chemically combined in it 40-55% of a member of the class consisting of coconut oil and coconut oil fatty acids, 1-8% of maleic anhydride, and unesterified hydroxyl groups in an amount equivalent to 0.4-10.2% of glycerine, the percentages being by weight based on the alkyd resin; and (2) lacquer-grade nitrocellulose, the weight ratio of the copolymer to the nitrocellulose being between 1:1 and 3:1.

A vinyl toluene-alkyd coating was patented by de Groot and Hofferth; this is a paint composition comprising filler, pigment, solvent, and a vehicle comprising about 90-70% by weight vinyl toluene-siccative oil copolymer, and about 10-30% by weight nondrying alkyd resin.[45]

Epoxies

Maslow reviews the applications of epoxy resins, their chemistry, formulations, and possible future uses.[45a] An article in *Corrosion Technology* describes the properties and applications of cold-cured epoxy resin-based coatings.[46] On the same subject, Dunn discusses epoxies in corrosion-resistant applications.[47]

The esterification of epoxy resins is the subject of a paper by Martin, Loible and Turner. The esterification reaction is described in detail, and the authors emphasize that production of satisfactory varnishes based on epoxy resin esters depends on a correct combination of esterification and thermal polymerization. A number of production points, leading to increased efficiency, are discussed.[48]

Wheelock describes the epoxidation of sodium polymerized liquid polybutadiene.[49] Each of the resins prepared was tested for rate of curing (i. e., relative hardness); it is concluded that a minimum of 8-10% of total oxygen is probably necessary in a resin to assure cure to a hard body in a suitable time, at least with amine catalysts. Similarly, a polymer requires a minimum epoxide oxygen content of 3%.

A study by Chadwick and others deals with theory and practice of resin-catalyzed epoxidation.[50] Commercial polystyrene sulfonic acid resins have been shown to be effective in catalyzing epoxidation of unsaturated fatty esters with hydrogen peroxide and acetic acid because they catalyze peracid formation but do not promote by-product formation when used under proper conditions. Special resins with less cross-linkage seem to yield mostly by-products. From work described in this study, it is concluded that a cascade process is the most practical; experimental procedures and mechanism of reaction are discussed.

Wohlers, Sack and LeVan discuss yield in epoxidation reactions, and suggest two new methods for improving yields: one uses partially preformed acetic acid, the other employs agitation control.[51]

A recent revelopment in England is the use of epoxidized oils, such as epoxidized soybean oil, as a fairly inexpensive source of epoxy resins. Coincidentally, epoxystearates such as butyl or octyl epoxystearate have been exploited. An article in PAINT AND VARNISH PRODUCTION describes the preparation of these new compounds, and details some of the chemical mechanisms involved.[52]

The employment of epoxidized oils as polyhydric alcohols for alkyd manufacture is discussed by Chatfield.[53] Preliminary investigation of the use of these oils in alkyds, both as polyalcohols and plasticizing agents, indicates that their employment in a variety of alkyds, and with a variety of techniques, should lead to improved production and easier processing.

In a two-part article Heavers analyzes the uses and limitations of styrenated alkyd epoxy esters. Heavers considers the properties in relation to the end use desired: speed of set, development of hardness, wrinkling resistance, resistance to water and humidity—all of which increase as styrenation increases; and oxygen absorption and flexibility, which decline as styrenation increases. The application of the esters is largely industrial.[54]

A symposium published in *Industrial and Engineering Chemistry* deals with epoxy plasticizers-sta-

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bilizers.[55] The first article in the symposium, by D. E. Winkler, describes new and modified epoxy stabilizers, including Epon 834 and Epon 562, an experimental material, poly(allyl glycidyl ether), a strontium soap, a cadmium soap, and dibutyl tin dilaurate. Greenspan and Gall discuss vinyl epoxy plasticizers, in particular the epoxyhexahydrophthalates, which protect poly(vinyl chloride) resins against degradation by heat and light. They are primary plasticizers and show excellent compatability at high concentration use levels, with no evidence of bleed after prolonged exposure to light. As combination stabilizer-plasticizers they are applicable to a wide range of vinyl resin formulations and products: hose, toys, flooring, packaging, film, foam. The third paper in the symposium, by Brice and Budde, treats the relationship of structure of epoxy esters to plasticizer performance. Hensch and Wilbur discuss epoxidized esters of glycols and pentaerythritol and their application as plasticizers for poly(vinyl chloride). The final paper in the symposium, by van Cleve and Mullins, deals with derivatives of cyclohexene oxide as plasticizers and stabilizers for vinyl chloride resins.

Epoxy-based masonry materials are the subject of a series by Maslow.[56] He discusses the properties and applications of epoxy systems. The paints are two component systems, and films dry by chemical curing—i. e., by polymerization and crosslinking after the film is cast and solvents evaporate.

Stivala and Powers describe modification on the molecular structure of the base polymer as a means of improving impact properties of epoxy adhesives.[57]

A paper by Fore, Magne and Bickford deals with the use of epoxidized jojoba oil as a stabilizer for vinyl chloride-containing plastics. The oil was found to be an effective thermal and u-v stabilizer for both TCP and DOP plasticized stocks, and to have no adverse effects on the plasticizer properties of these materials. The jojoba oil was found equivalent, or in some instances, superior to other epoxides tested.[58]

Patents

A number of patents deal with epoxy resins and compounds. United States patent 2,824,078 (C. Mellick) covers preparation of resins by combining a polyepoxide, the product of reaction between a dihydric phenol and a diepoxide or epihalohydrin, with a condensate prepared from the reaction of a fatty acid pitch with a polyamine. After processing, a tenacious coating is obtained, black, slightly resilient, and thermosetting. It is particularly useful for coating buried pipe lines.[59] Acrylic acid derivatives of epoxide resins are the subject of a patent granted to M. W. Hall.[60] United States patent 2,829,984 (L. L. Yaeger) describes the preparation of a product for coating metal surfaces; a polyepoxide is treated with a diisocyanate, then mixed with an amine. The mixture is immediately applied to a metal surface under water.[61] A patent to M. M. Safford describes a product consisting of a plasticizer, a mixture of a glycidyl polyether of a dihydric phenol and a polyamide, and polyvinyl chloride.[62] Modified epoxies are patented by Pritchard and Canterino.[63] A British patent covers glycidyl ethers of polyhydric phenols, prepared by treating a polyhydric phenol with epichlorohydrin in an alkaline medium, and said to be useful as surface coatings, adhesives, and molding compositions.[64]

Isocyanates

Baldin, Cummin and Bieneman review the properties and uses of polyurethane coating materials. Polyurethane vehicles can be used as both two-component and one-can stable systems. The two-component systems show fast set and drying under ambient conditions, hardness associated with extreme toughness and flexibility, adhesion to many types of substrate, abrasion and impact resistance, resistance to chemicals and solvents, weather resistance, and great versatility, allowing coating systems to be "tailor-made" for specific applications. The stable one-can systems have most of these desirable properties. With only minor sacrifices in these properties, it is possible to obtain a vehicle of excellent stability which can be pigmented by conventional means. This paper discusses effect of adjustments in type of catalyst, catalyst levels, and polyhydroxyl containing compounds. Typical paint formulations and pigmentation principles are considered.[65]

The chemistry and theory of polyurethane coatings is discussed by Pansing,[66] in a study of the reactions that involve the toluene diisocyanate isomeric mixture of approximately 80% 2-4-toluene diisocyanate and 20% 2-6 toluene diisocyanate. Steps in the manufacture of a representative diisocyanate are reviewed; typical reactions that the various hydrogen groups undergo are described. Dangers in the use of the isocyanates are cited. Methods for production of typical castor oil and diglyceride adducts are outlined, and an evaluation of the coatings is made.

Poswick and Dramais describe the results of a study of epoxy resins and masked polyisocyanates.[67] They conclude (1) that the combinations of these products in solution are not stable with time at room temperature; (2) that by eliminating oxirane rings from the ethoxylin resins, solutions are perfectly stable; (3) after polymerization, the urethane resins obtained present a remarkable hardness but a quite insufficient flexibility; and (4) that among the different methods studied to improve flexibility the most promising, at the present time, consists of making adducts from deepoxidized ethoxylin resins, diisocyanates and polyethyleneglycols in order to get modified deepoxidized ethoxylin resins presenting longer molecular chains.

Castor polyols for urethane coatings are described by Metz and others.[68] They review the chemistry of these polyols and of the urethane reaction, and describe the preparation of castor polyol/urethane prepolymer. The properties of the polyols are extensively investigated and analyzed, seventeen of them being evaluated for use in urethane coatings. In the prepolymer type of coating, an isocyanate hydroxyl equivalent ratio of 1.75 was found to be optimum for all castor polyols tested. In this system, glyceryl monoricinoleate (Flexricin 13) exhibited outstand-

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ing stability and film properties. In the two-can system, where a recommended isocyanate/hydroxyl equivalent ratio of 1.1 alone was used, ethylene glycol monoricinoleate (Flexricin 15) exhibited best over-all properties.

An article in *Farbe und Lack* reviews recent developments in diisocyanate polyaddition, emphasizing the fundamentals of the process, i. e., high-molecular synthesis by addition of diisocyanates to (mainly) polyhydroxy compounds.[69] In the same journal Pfluger describes results of an investigation of polyurethane-lacquer films prepared by the Desmodur-Desmophen process, confirming predictions as to their properties from the degree of bonding, etc. His paper also discusses the superior physiological properties and behavior of Desmodur L in the preparation of Desmodur-Desmophen lacquers.[70] Funke and Hamann determined the volatile isocyanate in Desmophen-Desmodur coatings; Desmodur T was found to exhibit the physiological irritation often observed with Desmophen-Desmodur lacquer coatings, and caused by traces of volatile diisocyanate. In the improved types of Desmodur THN and L, the isocyanate content was reduced. (The article indicates the amounts of volatile isocyanate in various Desmodur components—less than one-half of the maximum permissible concentration.[71] Working with the same lacquers, Albert advances an opinion that, because of their light color and outstanding adhesion, certain urea resins are suitable as primers for the application of Desmophen-Desmodur lacquers on wood surfaces, after preliminary treatment of the latter.[72]

Patents

A British patent covering raw materials for lacquers claims that lacquers showing good adherence are prepared by esterifying the copolymer of mixed esters with a polyhydric alcohol, followed by further reaction with an isocyanate.[73]

Phenolics

A review article by Fix deals with phenolic resins used in the protective coatings field; suggested formulas and test results are given.[74]

Burke and Rultman discuss linear phenol-formaldehyde polymers, specifically condensation of *o*-chlorophenol with formaldehyde. The reaction occurred readily at 150°C in a closed system in the presence of bis(2-ethoxyethyl) ether as solvent, and *p*-toluene-sulfonic acid as catalyst, to form high molecular linear polymers. Use of a high concentration of reactants and a small excess of formaldehyde favored higher molecular weight products, Infared spectra studies and analytical results on the polymers and their acetyl derivatives indicated that the *o*-chlorophenol residues were linked together in the *ortho*- and *para*-positions by methylene bridges.[75]

Brown, Watson and Siegfried investigated and evaluated the reaction products of furfuryl alcohol and Novolacs. The application of such furfurylated Novalac resins as laminates, coatings, molding compounds is considered, since certain of the properties are of interest. In connection with their preparation, reaction variables such as furfuryl-alcohol-phenol ratio, reaction pH, and formaldehyde- phenol ratio are discussed, and the chemistry of the reaction is described.[76] The thermal instability of Navolac resins is the subject of a study by Hoyt, Keuchel and Dean.[77]

Kammerer and Lenz issued a preliminary report on the synthesis of high-molecular phenol-formaldehyde condensates having uniform structure and uniform molecular weight; they describe and tabulate the compositions, melting points and yields of these compounds.[78]

Cresol-formaldehyde polymer coating compositions are the basis of a patent issued to Weber, Hoyt and Dinsmore.[79] To a semisolid cresol-HCHO- polymer, 3-10% of a low-boiling aliphatic alcohol or ketone solvent and an inorganic filler are added. The compounds have good storage stability and cure under normal conditions. They protect pipe lines, steel storage tanks, etc., from corrosion in the soil and in contact with hydrocarbon solvents. They can also be used as sealers for asphalts, cements, and other materials susceptible to cracking. Alkaline catalysts are used in preparing the compounds.

A Russian article reports that shale phenols in oil shale distillation products can be separated and used without refining in the manufacturer of oil-soluble phenol-aldehyde resins.[80]

Patents

A patent granted to Boiney describes a dicyandiamide-phenol-aldehyde resin varnish, prepared by reaction of phenol 1, dicyandiamide 0.8-2, and HCHO 0.9 mole per mole of combined phenol and dicyandiamide. The mixture is allowed to react in the presence of an alkylolamine catalyst for at least 0.5 hours, and then vacuum dehydrated. From 2 to 10% by weight of refractory solids can be added. Various types of materials can be impregnated with this material for lamination purposes.[81]

Another patent describes the dispersion polymerization of formaldehyde, yielding a normally solid, synthetic, film-forming composition.[82]

Polyesters

A review article by Chandler points out the advantages and disadvantages of the use of polyester resins, as compared with cellulosic bases, for wood finishes; the properties of clear and pigmented lacquers are described.[83]

Levine and Texmin discuss the properties of a series of linear polyesters made by polymerization of dibasic acids with acetyl derivatives of p,p′-diphenolic compounds, either of the dihydroxydiphenyl or the methylene bisphenol type with varying degrees of alkyl substitution. The crystallinity and first- and second-order transition temperatures of the polymers are considered in terms of their chemical structures; effects of symmetry and aromaticity are described.[84]

The use of additives in polyester resins for surface coatings, as a protection against air inhibition, is the subject of a paper by Keenan.[85]

In a detailed article in *Makromolekulare Chemie*, Funke, Roth and Hamann discuss the composition and synthesis of cured polyesters resins. Cured resins from unsaturated polyesters and styrene were degraded by aminolytic, hydrazinolytic and hydrolytic re-

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actions; the quantitative degradation reactions result in definite and identifiable polymeric products of solvolysis, and render cured polyester resins suitable models for investigating the structure of cross-linked polymers. The composition of degradation products and the yield of polymerized monomer units were determined quantitatively; a relatively simple relationship was found to exist between the composition of unsaturated polyester resins (of styrene and fumaric units) and the composition and yields of polymeric degradation products. This relationship is a function of the network formed during the curing of polyester resins.[86]

In the same journal Voigt discusses the photochemical degradation of unsaturated polyester resins, investigating their UV spectra.[87] Under the action of ultraviolet light at 30°C with exclusion of air, unsaturated polyesters (linear products as well as resins prepared by copolymerization with styrene or diallyl phthalate) were found to develop a diffuse ultraviolet absorption band with maximum extinction between 300 and 335 mμ which extended, upon prolonged irradiation, into the visible region, and caused yellowing of the product. The band, attributed to carbonyl compounds which may contain conjugated double bonds, is particularly intense with polyesters containing benzene nuclei. The complete suppression of the degradation band upon irradiation with wave lengths longer than 300 mμ may be due to a recombination effect of primary radicals. A possible mechanism for the formation of the degradation product is advanced.

Two articles in *Farbe und Lack* treat the subject of unsaturated polyester resins in the lacquer industry. Geilenkirchen, discussing the application of naturally drying unsaturated polyester resins, writes that due to the action of atmospheric drying and polymerization, lacquers based on these unsaturated resins harden throughout, irrespective of the coat thickness; this property permits a systematization of lacquer application. His article deals with other advantages of such lacquers, and with possible applications; it reports, also, the physiological activity of these products, as well as the effect of various peroxides, fillers, pigments, etc.[88] Trimborn gives an account of the effects of monstyrene vaporization, reaction heat losses, and of the inhibitory influence of atmospheric oxygen in the processing of unsaturated polyester resins, as they affect lacquer films; he deals also with the possibility of eliminating these influences.[89]

The preparation of rapidly drying films based on polyester resins from semi-drying oils and butyl orthotitanate is the subject of an article by Kiselev and Ermolaeva.[90]

Patents

Flame-resistant polyester resins are covered in United States patent 2,824,085 (W. Cummings).[91] Parker was issued a patent on oxalic acid- and thriphenyl phosphite-containing polyester-ethylenic monomer resins for coating of copper and copper alloys; in his process interpolymers of polyesters and vinyl monomers, used for coating or impregnating copper alloys, are made less corrosive by addition of oxalic acid and/or triphenyl phosphite. No discoloration of the copper was noted, and the rate of resin cure was substantially unaffected.[92] United States patent

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2,830,965 describes resin solutions suitable for producing bakable coatings. When the solutions are baked at high temperatures, they yield very heat-resistant coatings free from hairlike cracks.[93] Polyester coatings with a long pot life are described in another United States patent: compositions comprising polyesters containing polymerizable ethylenic groups and monomers containing CH_2 groups have improved pot life when 1-12% water is incorporated into the mix with the catalyst. These compositions are intended for larger-scale coating operations.[94] British patent 792,485 covers hardenable mixtures of polymerizable ethylenic derivatives and unsaturated polyesters; among other things, a clear lacquer is prepared.[95] A Swedish patent describes unsaturated polyesters which harden quickly at room temperature because of atmospheric oxygen; to avoid this latter drawback, the multivalent alcohol must be free from oxygen atoms in the ether bond and contain a residue of hexachloro - *endo* - methylenetetrahydrophthalic acid. During the copolymerization, a hydroperoxide is used as catalyst.[96]

Silicones

Silicone resin for cold blends is the subject of an article in PAINT AND VARNISH PRODUCTION; R-64 (Silicone Division, Union Carbide Corp.) is designed for cold-blending with alkyd, melamine and acrylic type baking enamels. The properties and problems of its formulation in particular kinds of paints are discussed, and pigment selection is considered.[97]

Brady, Johnson and Lyons deal with reactive silicone resin intermediates, and particularly the effect of the silicone content on processing and properties of various types of silicone-modified organic resins. The preparation of silicone-alkyd and silicone-epoxy resins is described, and certain favorable effects—notably an increased gloss retention—are detailed.[98]

A synthesis of polyorganosiloxanes based on attaching organic groups to inorganic silicon-oxygen chains structurally corresponding to the quartz molecule is described by Andrianov and Zhdanov.[99] This technique results in polymers becoming soluble in organic solvents,

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forming films typical for organic polymers and showing plasticity.

Patents

Arrandale and Dreyfuss patented the preparation of an organopolysiloxane coating.[100] Organosilicone resins are the subject of United States patent 2,830,968 (H. A. Clark); the compositions are described as useful in molding, coating, and the production of laminates.[101]

United States patent 2,831,008 describes a process for the manufacture of stable siloxanes by reaction of a member of the group consisting of cyclic siloxanes, siloxanes containing silanol groups and mixtures of these siloxanes with compounds containing monofunctional silyl groups, which comprises carrying out the reaction in the presence of a solid cation exchanger which prior to use has been treated with acids and washed until neutral reaction is obtained.[102] A room temperature-curing organopolysiloxane is patented by Berridge.[103] British patent 797,598 covers polysiloxanes suitable for use as coating compositions; these are prepared by condensing a polysiloxane with a polyphenol.[104]

Styrenes

An article in *Makromolekulare Chemie* deals with the stereospecific polymerization of styrene by organo-sodium compounds. Partially crystallizing polystyrenes were prepared, using fine suspensions of a variety of Na-organic compounds, at -20°C. The crystal yield increases with falling temperature of the polymerization (30% of polystyrene crystallized at 0°C, 80% at -20°C); the crystals melt at temperatures between 205-220°C. At constant temperatures, the intrinsic viscosities of the polymers decrease with the rise of catalyst concentration.[105]

In the same journal Kern and Braun describe an investigation of radical polymerization of *p*-bromostyrene, in bulk by azobisisobutyronitrile, and in emulsion by potassium persulfate (as initiator) and sodium oleate (as emulsifier) at 20°C. A relationship between the intrinsic viscosity and the degree of polymerization for fractionated poly–*p*–bromostyrene is given, and the chain transfer constant of the monomer calculated. Measurement of extinction coefficients permits calculation of the proportion, in weight percent, of *p*-bromostyrene in its copolymer with styrene. The authors report some results on cationic and anionic polymerization of *p*-bromostyrene using a variety of agents.[106]

Patents

Styrenated oils are the subject of United States patent 2,837,546. Specifically, two kinds of oil are described: a styrenated oil in which the oil is a glyceride selected from the class consisting of glycerides of 12-keto-oleic acid, glycerides of 12-keto-10-octadecenoic acid, and mixtures of these; and a bodied, styrenated oil in which the oil comprises a glyceride selected from the class consisting of glycerides of 12-keto-oleic acid, glycerides of 12-keto-10-octadecenoic acid, and mixtures of these.[107]

A United States patent issued to Cottrell et al. describes a process for the production of liquid styrenated drying oil fatty acids comprising heating a styrene-partially polymerized drying oil copolymer with an alkali metal hydroxide under reflux to saponify the copolymer, acidifying the saponified copolymer with a dilute mineral acid, and separating the styrenated drying oil fatty acids from the reaction mixture.[108]

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Vinyls

Melville, Peaker and Vale describe the synthesis of branched chain polyvinyl acetates. They employ a procedure which prepares the actual branches separately, so that they may be fractionated and characterized prior to combination with the main linear polymer; the latter is produced by low-temperature photopolymerization carried to a low degree of conversion. Partial hydrolysis of this backbone material introduces a small number of hydroxyl groups into the polymer, which is then condensed with low molecular weight polymer having an acid choride end-group. This is prepared by initiating the polymerization of vinyl acetate with 4,4'-azo-bis-4-cyanopentanoic acid, and subsequently treating this carbonyl-ended polymer with thionyl chloride. For molecules having the same over-all degree of polymerization, the limiting viscosity number appears to be insensitive to the extent of branching; the Huggins constant increases with branching, however. (The degree of branching was estimated radiochemically and by infrared analysis.)[109]

Two articles in *Makromolekulare Chemie* deal with vinyl polymerization. Otsu et al. discuss organic polysulfides as polymerization initiators. They found that diphenyl, dibenzyl, dibenzoyl, dithiobenzoyl, dibenzothiazoyl and dialkyl xanthogen disulfides are ineffective as initators of thermal polymerization of styrene, methyl methacrylate, acrylonitrile, vinyl acetate and vinylidene chloride at the temperature range, 60-120°C. The tetralkyl thiuram disulfides initiate polymerization of styrene and methyl methacrylate only, and are also excellent photosensitizers for these two monomers. All other organic disulfides investigated were excellent sensitizers of photo-polymerization of all monomers mentioned above.[110] Otsu and Nayatani report on the polymerization of styrene initiated by tetralkyl thiuram disulfides. Their investigation, carried out at the temperature range, 50-90°C, established that the rate of polymerization increases with the 0.3-0.5 power of the concentration of thiuram initiator, and showed an over-all activating energy of 17 to 23 Kcal/mole. In light-protected thermostat, the six thiuram disulfides investigated had a retarding action on the polymerization of styrene, and a weak initiating activity; the latter, however, became excellent in the presence of light. In addition, chain transfer constants of tetralkyl thiuram disulfides were determined at 60°C.[111]

Liberti and Pierrehumbert describe a vinyl acetate emulsion exterior surface conditioner. National Starch Products has developed a tung oil modified vinyl conditioner that has considerably extended the durability of emulsion paints over "chalky" surfaces. A penetrating primer—829-90-2C—is described; it penetrates through layers of chalk down to the film substrate, and dries to form a firm surface which provides a base for attractive and durable exterior PVA finish coats.[112]

Polyvinyl chloride and its copolymers in the protective coatings industry are the subject of a paper by Deutsch. The chemistry and properties of vinyl resins, stabilization of vinyl compounds to heat and light, pigmentation practices, permeability of vinyl films to moisture and gas, and specific formulations are discussed.[113]

Hollis describes the properties of petroleum resin modified polyvinyl acetate paints. Satisfactory paints

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of this kind may be prepared using Carbitol acetate or butyl Carbitol as film forming aids, and low plasticizer levels. These paints have improved soil removal properties and perform well.[114]

An article by E. F. Jordan and others discusses copolymers of vinyl formate containing various amounts of vinyl stearate; these were prepared by mass polymerization at 30°C in the presence of small amounts of isopropanol. A study of the molecular weights and the viscosity properties of these copolymers indicated that they have high degrees of polymerization and are little branched. A study of the X-ray diffraction patterns of the copolymers of vinyl alcohol and vinyl stearate indicated that the alcohol and stearate segments crystallize in separate lattices. The tensile strength of vinyl alcohol copolymers decreased as the vinyl stearate content increased and as their water content increased. When the samples were dried or were oriented, their tensile strength increased. Copolymers of vinyl alcohol containing as little as 1.5 mole% of vinyl stearate had greatly improved resistance to water and were insoluble in water at 98°.[114a]

Barnes describes the reactions of phosphoric acid with polyvinyl acetals. Two of the possible reactions between polyvinylbutyral and phosphoric acid in 95% ethanol were investigated. Some hydrolysis of the acetal linkages has been found to take place although the extent is less than for simple monomeric acetals. No evidence has been found to indicate that there is, in ethanol, any esterification of the phosphoric acid by the hydroxyl groups of the polymer.[115]

Patents

United States patent 2,823,191 covers chloroethylene polymer-containing lacquers stabilized with ethyleneimines. Vinyl-polymer lacquer coatings are made resistant to exposure at 100° by combining solutions of a copolymer of a chlorovinyl compound and at least one other chlorovinyl or Cl-free polymerizable compound with solutions of polyethyleneimine or ethyleneimine. In a typical example, 5 parts ethyleneimine was added to 100 parts of a 20% solution in 1:1 ethyl acetate and ethyl cellosolve of a copolymer of 70 parts vinyl chloride and 30 parts butyl acrylate. After conventional application and short preliminary drying, the coating was baked for 2 hrs. at 120° in a steam-heated chamber to give an elastic adherent, waterproofed, solvent-proof film, resistant to temperatures greater than 100°.[116]

The subject of United States patent 2,837,490 is a vinyl mixture; a composition comprising asbestos containing iron oxide, a resin component selected from the group consisting of vinyl chloride resins and vinylidene chloride resins, and a stabilizer.[117] Gollub, Wood and Berberich patent a method of bonding a vinyl resin coating to a surface which comprises applying a primer to the surface, the primer comprising a mixture of a methyl methacrylate polymer and an unesterified epoxy resin dissolved in an organic solvent, the ratio of the methacrylate polymer to the epoxy resin being between approximately 15:85 and 99:1, volatilizing the solvent, applying a vinyl resin dispersion to the primed surface, and then heating the dispersion.[118] A polyester plasticized vinylidene chloride is patented by Dilke and Ripley–Duggan.[119] A polyvinyl halide resin adaptable for sizing glass surfaces is covered in United States patent 2,853,465; it comprises a mixture containing 80-97% of a homopolymer of a vinyl halide and 3-20% of a polymer of N-vinyl pyrrolidone.[120]

Vinyl halide resins were patented by Magne, Skau and Feuge: their patent covers a vinyl chloride-vinyl acetate copolymer predominating in polymerized vinyl chloride containing from about 50 to 66 parts per hundred parts of resin of a plasticizer comprising a mixture of ester of phosphoric acid mixed with from about ¼ to 1 part of a mixed triglyceride consisting essentially of diaceto-olein.[121] A plasticized polyvinyl resin composition is the subject of a patent granted to Greenspan and Gall.[122]

Rosin & Natural Resins

A fumaric modified rosin is described by Halbrook and Lawrence. This is an addition product, prepared by allowing rosin to react with fumaric acid; it differed from the addition product of a maleic anhydride rosin in physical properties such as acid number and melting point. The compound can impart these differences to its glycerol esters. Fumaric modification converts to the maleic modification on continued heating, hence, a series of products may be obtained with characteristics intermediate between the two modifications. The reaction rates of tall oil and wood resin were slightly less than those of gum rosin.[123]

The oxonation of rosin is discussed by Levering and Glasebrook. Rosin reacts with carbon monoxide and hydrogen to add a methylol group to the unsaturated components. A solvent and preformed cobalt carbonyl are needed for high yields. Oxonated rosin, polyesters and other esters from rosin have a number of interesting properties.[124]

Minor and Lawrence deal with the esterification of methylolated rosin. Improved rosin-based varnishes can be prepared by methylolating rosin with formaldehyde. This produces a mixture of bifuntional hydroxy resin acids which, when inter- or trans-esterified with drying oils yields low acid number, high viscosity products which can be further neutralized by glycerol esterification. The procedure offers advantages over conventional ester gum-linseed oil processes: economies, faster drying varnish films, and superior water resistance.[125]

An article in *Industrial and Engineering Chemistry* considers the catalytic perhydrogenation of rosin. Rosin is difficult to perhydrogenate-i. e., to remove from it all olefinic and aromatic unsaturation. A catalytic method is suggested here: Rh, Ru and Pd completely saturate rosin. The method is described in detail. End-product is colorless and resistant to oxidation, while still retaining other properties of rosin. It can, therefore, be used where undesirable effects such as darkening, loss of lack, or presence of odor are to be avoided. The perhydrogenated rosin should be valuable in lacquers, adhesives, and chewing gum formulation;

however, the product is not yet available in commercial quantities.[126]

Inhibition of resin acid isomerization is the subject of a paper by Loeblich and Lawrence. Partially neutralized resins from pine gum should find direct use as paper sizes and soaps, and as starting materials for making precipitated metal resinates and maleic-, fumaric- or formaldehyde- modified resins.[127]

Patents

A water-soluble shellac powder is the subject of a patent issued to Kalkhof-Rose.[128] Bleached shellac is dispersed in water, spray-dried, and the resulting powder, though readily dispersible in water alone, dries irreversibly from the resulting aqueous solution. When applied as a coating, the dried film cannot then be redissolved in water alone.

L. Lacroix has patented a treatment of copal resins.[129] Transformation of these resins to a state useful for manufacture of lacquers, varnishes, linoleum, amber substitutes and plastics is accomplished by pulverizing the resin, suspending the powder in water at 40-60° for one hour, and adding formaldehyde and acetic acid or borax to the warm suspension. After one hour, the solid is filtered, washed, dried, and dissolved in butyl alcohol. Distillation of the solvent yields a resinous substance which is readily and directly incorporated into a lacquer.

Miscellaneous

Nitrogen-Containing Resins.

The Versamids (General Mills Co.) are the subject of a paper by H. Wittcoff.[130] The preparation and properties of these versatile polyamides are described.

Mihail, Biffman and Rizea discuss a technique for copolymerization of an unsaturated polyester with nitrogen-containing monomer. Properties and uses of the resultant polymers are described; an important use cited is as hardening agent for epoxy resins.[131]

A general review of the chemistry and processing of amino coating resins is the subject of a paper by Schollick.[132]

Widmer treats of the synthesis and composition of a raw material prepared from allyl-melamine-ether, the films of which dry in the atmosphere and simultaneously harden by polymerization action of peroxide. The transparent or pigmented coats are hard, scratch-proof, fast to light, and exhibit a high gloss and excellent resistant to solvents, alcoholic beverages and dilute acids.[133]

United States patent 2,827,441 covers a stable, amine-modified urea resin.[134]

Polyacylacetates of polyhydroxy esters.

Two British patents granted to E. I. du Pont de Nemours & Co. deal with polyacylacetates of polyhydroxy esters and their chelates. Glyceryl or pentaerithrytol esters containing free OH group form esters of $RCOCH_2COOH$ containing two or more $RCOCH_2COO$ groups that are polyligand chelating groups.[135] A solution suitable for preparing insoluble hard coatings is obtained from a polyligand which has a plurality of chellating groups (cf. above patent), and a metal chelate of a volatile chelating agent in a solvent. When the solvent is evaporated, transchelation of the metal to the polyligand occurs, and air-drying or baking leaves a film of polymer cross-linked through the chelate rings.[136]

Miscellaneous Resins and Polymers.

A general review of the field of allyl polymers, particularly of allyl esters, allyl ethers, and polymerization of allyl compounds is the subject of an article by Schreiber.[137]

Korshak discusses some special features of organic polymers containing phosphorus.[138] Polymers containing pentavalent phosphorus in the main polymer chain were investigated; it was found that the nature of the starting materials has a very marked effect on the properties of the polymers obtained, and that the introduction of phosphorous into the chain leads to molecules with greater flexibility.

An Eastman Chemical Products material comprises sucrose acetate isobutyrate; incorporated into coating formulations, its behavior is intermediate between a resin and a plasticizer. It increases solubility, hardness, and has a high degree of compatability, very high gloss. Plastic lacquers made with it exhibit very good adhesion to a variety of plastics. Other unusual properties of SAIB include its rapid decrease in viscosity with slight increases in temperature.[139]

Kelly, Smith and Roche discuss the chemistry, manufacture and history of Hypalon.[140] The preparation, pigmentation, curing and properties of paints made with it are described. Solubility of the chlorosulfonated polyethylene, its compatability with other film-formers, commercial applications are reviewed. Notable are Hypalon's weatherability, abrasion resistance, and chemical resistance; these are considered with respect to specific formulations, application techniques, and service-life data.

Patents

Allyl glycidyl ether copolymers and their film-forming esters are the subject of a British patent issued to Ringwald.[141]

United States patent 2,832,755 covers monomeric polymerizable ureido and thioureido compounds and their polymers; the compounds were polymerized in many conditions and were found useful as coatings or films for metal and glass.[142]

R. T. L. Cornwell patented a film-forming composition comprising (1) an organic polymeric film-forming material selected from the group consisting of thermoplastic resins, thermoplastic cellulose esters and ethers, thermosetting resins, and mixtures of thermoplastic and thermosetting resins, and (2) as a plasticized the dipropionate of N,N'-bis (beta-hydroxyethyl) terephthalamide.[143] Grummitt and Arters patented a method of making aqueous vehicles for forming water-resistant films.[144] Tough, impact-resistant resins are the subject of a patent granted to Fiedler and Florentine.[145] The same patentees cover preparation of methylolated compositions in United States patent 2,859,204.[146]

Cellulosics

British patent 795,402 covers a plasticized nitrocellulose product. Nitrocellulose granules associated with a plasticizer are produced which can conveniently be used for coating compositions.[147]

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LATEX EMULSIONS

LAST year's total consumption of latex paint was placed at 65 million gallons, a gain of 5 million gallons over 1957. With this rate of growth, it has been estimated that the total volume of latex paints will go beyond 90 million gallons by 1962. According to recent statistics, last year's latex volume comprised of the following types and percentages: styrene-butadiene—59%, polyvinyl acetate—29%, and acrylic—12%.

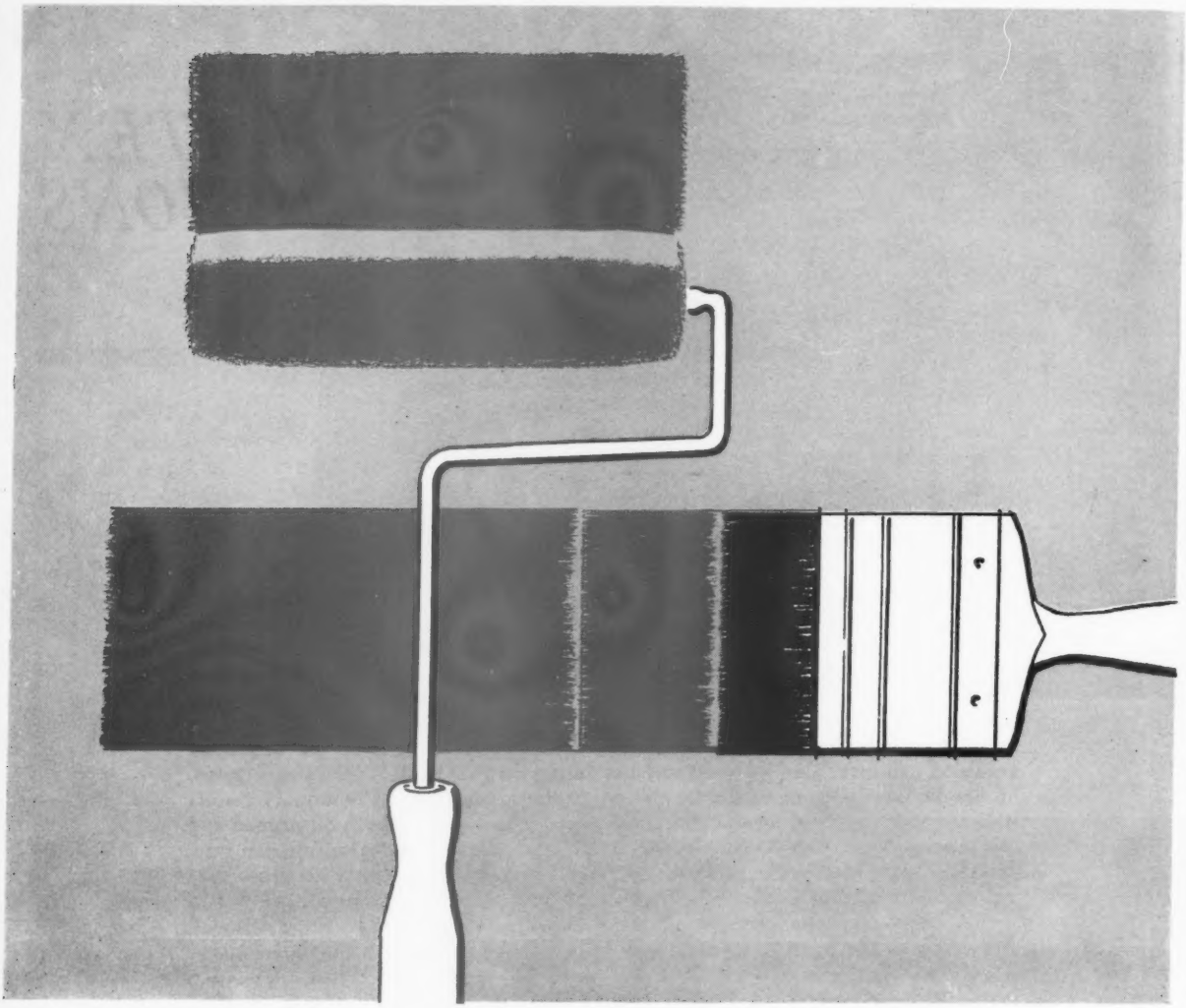
Considerable effort was directed toward the development of satisfactory latex emulsion paints for exterior wood surfaces during the past year. At the present time, an acrylic latex is being tested for this particular application. Preliminary results indicate that the durability of this acrylic system is best over both oil primed and self primed wood. Other properties include high moisture vapor transmission rate, good adhesion unaffected by moisture, excellent polymer stability to ultraviolet light, good low temperature film coalescence, and good freeze thaw stability.

Another acrylic emulsion is being evaluated for application on wood surfaces. According to the manufacturer, the present technology requires that a relatively impervious coat, generally an oil paint, be applied to the wood before application of the emulsion system. Recommendations have been made to use a very low PVC (in the range of 10%) as a first coat on wood. However, the exposure history of this type of prime coat is limited. Furthermore, these coatings suffer rather severly from high cost compared to oil systems.

One technique to keep exterior polyvinyl acetate paints from peeling and blistering is to add small amounts of aromatic solvents such as xylene or toluene to water-thinned formulations.

A recommended method for painting weathered wood surfaces is to use a vinyl emulsion primer which penetrates, binds, and conditions chalky surfaces. Besides conditioning the surface to be painted, these pigmented penetrating primers allow moisture to escape through the film to minimize blistering. This is followed by a top coat of a vinyl emulsion exterior paint.

Other important developments which took place in this field during 1958 include a polyvinyl acetate emulsion for formulating semi-gloss and gloss paints; another polyvinyl acetate base for producing high PVC emulsion paints; a styrene-butadiene latex with uniform particle size which is said to reduce foaming during agitation; an acrylic-vinyl latex copolymer with low particle size making it possible to produce paints with high PVC and still maintain good film properties; a vinyl acetate copolymer for formulating a thixotropic paint which has a gelled consistency in the can but flows smoothly onto surfaces in a coat scarcely thicker than a conventional latex paint.



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SHAWINIGAN RESINS

General

Riese discusses critically problems arising in the preparation of dispersion paints, including the manufacture of butadiene-styrene, vinyl acetate and acrylate polymers, pigmentation of aqueous systems, and related questions such as pigment-volume concentration. His article also deals with such additives as defoamers, fungicides, etc.[1]

The three principal types of water-thinned paints for finishing metals are surveyed by Brenner; these are the styrene-butadiene, poly(vinyl acetate) and acrylic. Brenner's discussion includes properties and composition.[2] In the same vein, Broughton reviews generally the formulation, application, and drying of water-base industrial finishes.[3]

In two articles, Johnson describes the manufacture of oil-in-water and water-in-oil emulsion paints, reviews some of the significant developments in the field, and lists some of the newer products available.[4,5] Two bibliographical surveys in *Paint Manufacture* cite recent literature covering emulsion paints.[6]

An article by Allyn deals with the evaluation of acrylic, polyvinyl acetate, and styrene-butadiene paint systems; methods of production, their use in paints, recent formulations, and advantages in their employment are discussed.[7]

Industrial epoxy emulsions are the subject of a paper by Thomas.[8] The formulator of water-thinned paints, notes Thomas, faces problems particular to his industry: wetting of the metal; sensitivity to the metallic ion; mechanical stability of the emulsions; inactivation of water-sensitive materials in the film; wetting of the pigment in forming the dried film—these problems are additional to the conventional problems of cure, flow, gloss, color, etc. Thomas' article reports primarily the work being done in utilizing an emulsion of an epoxy ester in formulating an industrial type primer. The properties of Poly-Tex 611-B are described in detail.

West describes a new alkyd emulsion, water-dispersed and containing no conventional emulsifying agent. The emulsifying principle disappears as the film dries. The characteristics of the emulsion, and of the film, are reviewed in detail; formulation, application, are discussed.[9] Baker writes of the properties of Synthemul alkyd emulsions.[10]

A paper in *Peintures, Pigments, Vernis* describes commercial plasticizers for paints and lacquers, plastics and synthetic rubbers.[11]

Acrylics

In a detailed review, Prane discusses the development of an exterior acrylic latex paint for masonry, from the original sales department request to production of the first plant batch. The properties of latex paints are described, and methods of testing them are dealt with.[12] Gordon reports an extensive study of Lytron 680, an acrylic-type complex interpolymer latex for exterior paint formulations.[13] A review by Allyn covers properties, manufacture of water paints, and advantages in their use; particular emphasis is laid upon vehicles and pigments.[14] The same author writes of water-reducible acrylic industrial finishes, citing especially their reduced fire hazard.[15]

Styrene-Butadiene

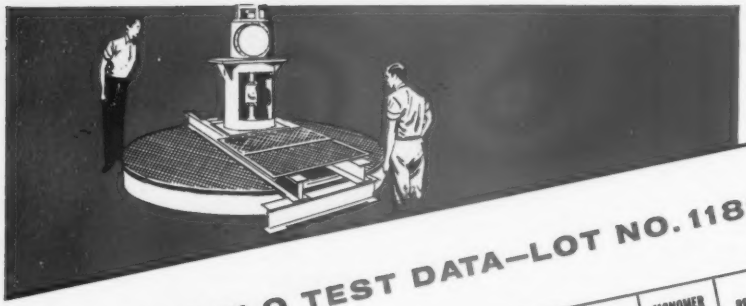
In an article by Carpenter, the special needs of a masonry substrate are considered, and how a styrene-butadiene paint meets them. Exterior exposure data are analyzed. Typical formulations are described. The author concludes that styrene-butadiene latexes are well suited for exterior masonry paints; they demonstrate durability in both northern and southern climates: they show, for example, good alkali resistance, exceptional mildew resistance, low dirt retention. They exhibit package stability; they possess "ideal" application properties; and their cost is low.[16]

Vinyl Emulsions

O'Neill discusses solved and unsolved problems in the field of polyvinyl acetate emulsion paints. His article is a detailed survey of progress made in England in meeting some of these problems, with particular reference to the work done at the Paint Research Station, Teddington. The problems range from the initial polymerization of the monomer, through the problems of the liquid paint, to the film formation process and the properties of the film. Although much work has been done, the author presents an impressive list of unsolved problems.[17]

Vinyl acetate emulsion polymerization is the subject of several articles. O'Donnell, Mesrobian and Woodward describe polymerization at 70°C using potassium peroxydisulfide as initiator and a partially hydrolyzed polyvinyl acetate as emulsifying agent.[18] French reports an investigation using block polymers of ethylene and propylene oxides (Pluronic surfactants) as emulsifying agents.[19] A radioactive tracer study of copolymerization vs. post plasticization of polyvinyl acetate emulsions is cited by Gorden. A copolymer of vinyl acetate and radioactive dibutyl fumarate was prepared and incorporated into a surface coating, using C^{14}. The loss of radioactivity on exposure of this coating was used as a measure of the effect of exposure on the copolymer. From data gathered it is concluded that copolymerization ties up the comonomer so that migration due to volatilization is substantially eliminated; for low-boiling plasticizer, migration of plasticizer is rapid, and the rate of migration is not affected to a marked degree by exposure to weather; indications are that for higher-boiling plasticizers, a substantially greater loss will take place on exposure, and effects other than volatility of the plasticizers will play a more significant role.[20]

Edbrooke, Fair and Grimshaw consider gelled PVA emulsion paints.[21] Recent work has shown that the rheology and structure of some polyvinyl acetate emulsion systems can be completely altered by addition of very small amounts of certain alkali metal silicates. Addition of these silicates to emulsion paints based on specific PVA emulsions can also change their structure, and an emulsion paint that sets to a firm gel in the can can be made. These paints do not drip or spatter during application. The authors discuss requirements for this type of paint, formulation, addition of silicate in varying pro-



GEN-FLO TEST DATA—LOT NO. 1189—MN 58

TEST	SURFACE TENSION	Ph	% COAGULUM	VISCOSITY	FREEZE THAW	TOTAL SOLIDS CONTENT	MONOMER CHARGE RATIO	RESIDUAL STYRENE	SPECIFIC GRAVITY	MECHANICAL STABILITY	PARTICLE SIZE	
O. K.	✓	✓✓ ✓✓	✓	✓	✓	✓✓	✓	✓	✓	✓✓	✓	✓
FAIL												
INITIAL	JK	cm Dmk Sna SH.V.	SK	me	BV	HP QP	DZ	DH	SP	JR MS	RK	CHA
DATE	10/15	10/15 10/15 10/16 10/15	10/15	10/15	10/15	10/15 10/15	10/15	10/15	10/15	10/15 10/15	10/15	10/15

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Odor	Extremely mild
Mechanical stability %	0.03
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portions, measuring of gel strength, and properties of the paints.

Determination of the critical pigment volume concentration of vinyl emulsion paint systems by the pigment water sorption method is the subject of a paper by Liberti and Pierrehumbert. The water sorption values of both prime and extender pigments were established by titrations with a dispersant solution of Tamol 731 and potassium tripolyphosphate. These values in turn were used in a simple calculation for the determination of a theoretical critical pigment volume concentration. A series of pigments and pigment combinations were evaluated for CPVC determinations by the scrub test method, tensile strength and elongation. Test data are tabulated and analyzed, to show that the theoretical CPVC derived by water sorption value (calculated) approximates that obtained by the above methods with a variation of approximately $\pm 3\%$. Other tests indicated that particle size of the emulsion does not necessarily influence CPVC. The determination is said to be useful only in establishing a proper balance of pigment to resin solids to obtain optimum paint properties.[22]

Writing of effective filming of polyvinyl acetate latex paints, Schwahn and Sullivan cite data covering suitable types of filming agents of three kinds: plasticizers, volatile water-soluble types, and volatile water-insoluble types. Preferred methods of addition are described. It is noted that copolymers of vinyl acetate can be used successfully in both interior and exterior paint applications—a fact due more to the increased film-forming potential obtained by incorporating a softening comonomer than to any need for increased film flexibility.[23]

Londergan notes that emphasis has been placed of late on higher pigment volumes for polyvinyl acetate paints because of their higher hiding power and the lower cost that results from replacing the relatively more expensive binder solids with the cheaper extenders. His article discusses pigmentation of post-plasticized polyvinyl acetate at pigment volumes of 40, 45, and 50%; pigmentation with rutile and anatase titanium dioxide over a range of water demands at these pigment volumes; and properties of paints at the three pigment volumes. Interior and exterior paint formulations are considered.[24]

Reviewing evaluation of PVA emulsion paint systems, Terry tells the story of these paints from the laboratory experimental stage to the point of marketing. Some of the problems of processing are discussed, as well as procedures for testing, application, properties, various kinds of finishes, and primers.[25]

Casein

Use of modified casein for the stabilization of latex-based paints is the subject of a study by Genin.[26] Casein, partially hydrolyzed with trypsin, was found to stabilize pigments in rubber-based paints, without causing an increase in viscosity of the paint emulsions. The same author describes adaptation of casein as a stabilizer in present-day latex paint.[27]

Patents

Several latex emulsion coatings are the subject of a United States patent issued to Daniel; the emulsions, when dried and baked as coatings on wood, metal, etc., produce hard, glossy films resistant to solvents and chemicals.[28] Miller, Bebb and Musch obtained a patent on a freeze-resistant polymer-containing latex paint.[29] A patent issued to Mark and others covers vinyl acetate emulsions; poly(vinyl acetate) emulsions with some plasticizer and with hexylene glycol are of use in water-based paints. Copolymers with 23% dibutyl maleate give tough films with maximum scrub resistance. No difference was noted between maleate and fumarate. Mortar paints containing an excess of cement even adhere to metal and prevent corrosion in a Weatherometer.[30]

Defoaming compositions for latex paint are patented by Leonard, De Castro and Groll. The compositions are described as containing essentially about 6% polyethylene glycol (600) monooleate, 16% stearic acid, 58% paraffin oil (28° Baume), 3% by weight of a methylpolysiloxane, and the rest substantially water.[31]

A British patent issued to Richmond and Creswell covers aqueous emulsion gloss paints. A synthetic latex is mixed with a pigment dispersion containing 0.5-4.5 mg. of protective colloid/sq. m. of pigment surface area, producing a gloss paint having excellent application and flow properties and good shelf life.[32] Latexes suitable for paint formulations, with good electric and freezing stability, are made from 1,3-butadiene and methyl methacrylate, with stepwise addition of cationic and anionic emulsifying agents, according to British patent 790,070.[33] National Starch Products, Inc., in a British patent, covers paints compounded from internally plasticized resins; these are water-base paints wherein the addition of plasticizer is not necessary.[34]

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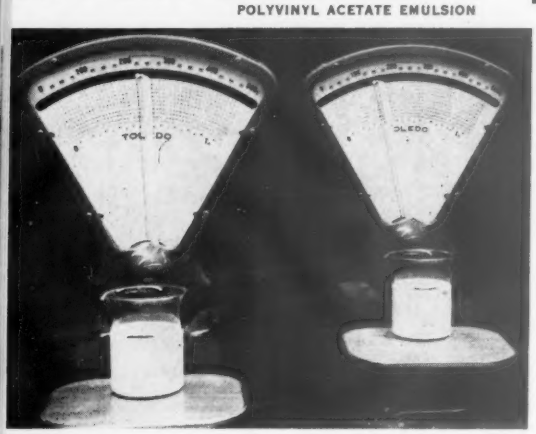

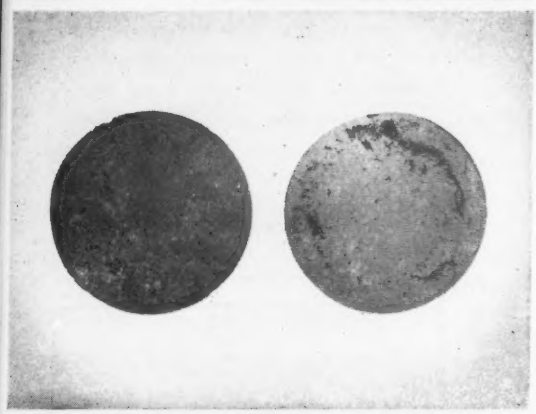

RESISTANCE TO FOAMING

The Test: 800 grams of "ELVACET" 1423 and of a leading competitive emulsion were agitated simultaneously on a paint shaker for 10 minutes. Beakers of identical weight were placed on lab scales.

Result: When equal volumes of the two emulsions were poured into the beakers, foam-resistant "ELVACET" 1423 (left beaker) weighed 64% more, because competitive emulsion trapped high percentage of air.

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The Test: 200 grams of "ELVACET" 1423 and of a leading competitive emulsion were agitated vigorously for 2 min. in a household blender. Each emulsion was then passed through a 60-mesh screen. Both screens were allowed to dry.

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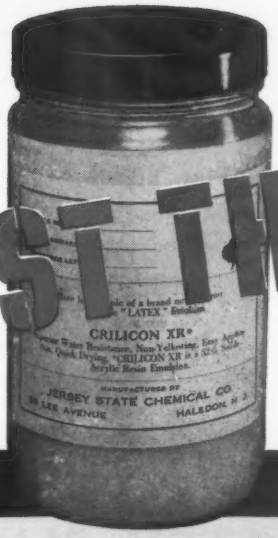

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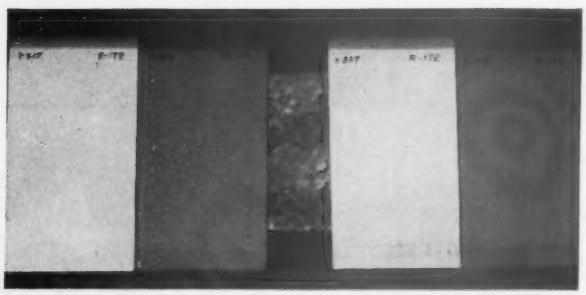
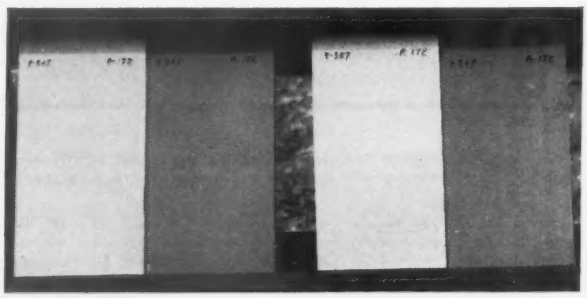


Dow Latex 2647 — Commercial Acrylic Latex A



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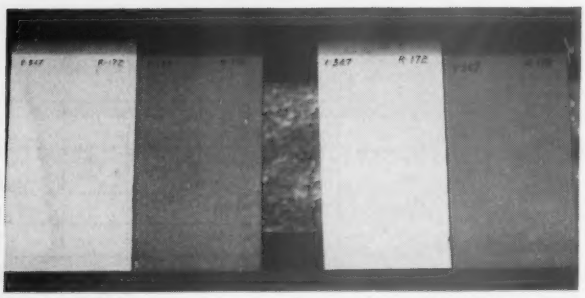
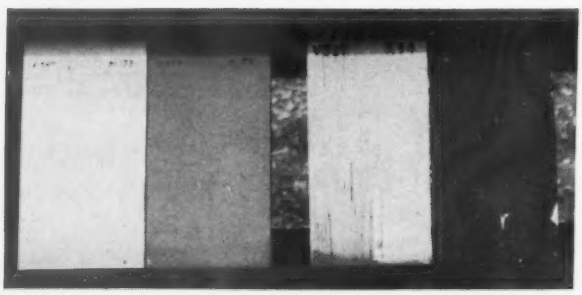


Dow Latex 2647 — Commercial Acrylic Latex B



Dow Latex 2647 — Commercial Polyvinyl Acetate Latex

These test panels illustrate the excellent durability of Dow Latex 2647 as compared to other latex paint binders. All are red cedar panels exposed for 2½ years at 45° South. The left panel, in each instance, is over an oil primer and the right half is over bare wood.

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DRYING OILS AND DERIVATIVES

IN analyzing the technical achievements which took place in drying oils in 1958 there is one development which holds considerable promise. This is concerned with coatings based on vinyl ether copolymers of fatty alcohols converted from soybean and linseed oils. Research conducted by H. M. Teeter, L. E. Gast, and J. Cowan at the Northern Utilization Research and Development Division, USDA in Peoria, indicate that these coatings will find application in the metal (particularly cans) field because of their unusual adhesion to metals including black iron and aluminum. Also, they have superior resistance to water, alkali, and acid. Other important applications of this film former, in addition to replacing tin on cans, include interior can linings, can and drum exterior decorative coatings, appliance finishes, maintenance paints, and primers for concrete and masonry.

The development of fire-retardant coatings from isano oil was another important accomplishment in drying oil technology last year. Isano oil is an unusual type of vegetable oil. Its fatty acids have conjugated acetylenic bonds, a terminal ethylenic bonds, and a hydroxyl group. When isano oil undergoes certain heat treatment, an exothermic reaction takes place with the evolution of heavy white fumes. This property led to the use of isano oil as an intumescent vehicle in fire-resistant coatings. When a surface coated with a paint which contains raw isano oil and drying oil is exposed to sufficient heat, the exothermic reaction set off causes the film to swell by the evolution of gases, thus providing a protective insulating layer.

Other important developments include ethoxylating castor oil or its derivatives to make them water dispersible or miscible for possible application in emulsion systems as stabilizers, levelling agents and anti-foaming agents; and chemical modification of drying oils with vinyltoluene and diisocyanates.

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General

A review article by Renfrew and others covers the economics of drying oils and describes recent research on them. The authors discuss the nature of such oils, the effects of environment on their behavior, and ways of modifying them to increase their value not only to the paint industry, but in broader applications. The modification of the oils, for the purpose of enhancing certain properties, is considered in detail, particularly the vinyl toluene method and diisocyanate-modified oils; urethane oils are also described.[1] A literature survey by Hutchinson embraces the years 1955-1956 for advances in the chemistry and technology of drying oils.[2]

A two-part series by Weiss deals with surface coatings derived from tall oil.[3] The first article discusses the composition of tall oils, and the possibility of using them in various coatings. It has been found that organometallic compounds containing aluminum when added to drying, semidrying and nondrying oils lead to improvements in their properties in relation to their use in surface coatings. In the second part of his series, Weiss discusses synthetic drying oils made from tall oil. The drying time, film properties, and water resistance are dealt with. Outdoor weathering tests are described, and tall oil pitch is considered. The synthetic oils derived from tall oil dry without wrinkle, and skinning has never been observed; moreover, the oils dry with a good gloss. Adhesion is generally good (including that to plate glass). Elasticity, however, is rather poor. Water-resistance is high: films derived from these oils remain clear and quite transparent even after months of exposure to water. Another outstanding property of the films is their resistance to fouling and mold growth—a property suspected of being related to the fact that films prepared from synthetic oils do not swell in water, or swell less than those prepared from natural oils.

The causes for yellowing of stand oils during manufacture are the subject of a paper by Balbi.[4] Such yellowing of stand or heat-bodied drying oils—linseed, grapestone, sunflower, soya, etc.—may be caused by (a) too high a processing temperature: above 285° triglycerides of saturated fatty acids decompose; (b) presence of traces of soap or fuller's earth from alkali refining; (c) dissolving by the fatty acids of Mn from poor-quality stainless steel equipment. The author discusses some of the ways of overcoming these difficulties and describes a simple test for determining whether a refined drying oil will yield a light-colored stand or heat-bodied oil.

An article by Ivanova deals with the preparation of film-forming substances based on nondrying and semidrying oils. Dehydration products of castor oil are described; heated castor oil formed varnishes superior to those prepared commercially with soluble lead catalysts, and the elasticity, hardness and water- and weather-resistance of the films compared with those of linseed and tung oils. Cottonseed oil hydroxylated with pentaerythritol and with Pb-Mn resinates and then dehydroxylated with 2% $NaHSO_4$ gave varnishes which dried completely in 24 hours and compared with those from linseed oil. Sunflower and corn oils heated and dehydrated in the presence of 2% $NaHSO_4$ (and rapeseed oil with 1% pentaerythritol added before oxidation) gave varnishes which dried in 24 hours. Shale oil treated with 3% of a catalyst consisting of the inorganic part of shale oil gave satisfactory varnishes.[4a]

Sims writes on the viscous behavior of polymerized vegetable oils.[5] Because of the importance of bulk viscosity in vegetable oil polymerization and the strong effect of high molecular weight material on viscosity, fractions of polymerized linseed oil were prepared and studied. Sims' paper describes the effect of molecular weight and polymer concentration on activation energy of viscous flow and the results of investigations to determine whether intrinsic viscosities could be obtained for this type of polymer and whether polymerized linseed oil behaved like other polymer systems well removed from their transition temperatures.

A review of present techniques of refining and bleaching vegetable oils is contained in an article by James.[6] Smith and Hull[7] assess significant recent trends in cottonseed and competing oils. Narang and Sadgopal review the chemistry of Indian stillingia oil and tallow: caprylic, myristic, stearic, oleic, linoleic and linolenic acids were found in the oil.[8]

In a review of the chemical structure and preparation of polymer acids of drying oils, Petit shows how, from the polymer acids of stand linseed oil, pure dimer and trimer esters can be separated.[9]

Analysis

Minutilli describes the spectrophotometric examination of linseed oil during standolization in an inert-gas atmosphere, and concludes that stand oils prepared in an inert atmosphere (CO_2 or N) are of better quality than those prepared by heating air. Spectrophotometric examination of the behavior of the oil during heating shows that the amount of conjugated diene bonds increases with the time of heating; the ratio of two consecutive extinction coefficients tends to a constant value.[10]

Antioxidants

Paquot and Mercier describe a comparative study made of the effectiveness of the main antioxidants on the French market with respect to linseed-oil ethyl esters (carefully distilled and free of any natural antioxidant). The antioxidation tests were followed by iodometric determination of peroxide numbers. Materials and procedures are described, and results tabulated. Nordihydroguairetic acid, hydroquinone, pyrogallol (at the rate of 0.01%) and Metophan (at rates of 0.1 and 0.05%) proved to be excellent antioxidants.[11]

Fatty Acids

Mills discusses film-forming materials obtained by catalytic condensation of fatty acids through their carboxyl groups, with evolution of water and carbon dioxide, products having drying qualities greatly superior to those of corre-

sponding glycerides. Thus, air-drying paints can be made from such raw materials as groundnut acids, without the necessity of introducing resin modification. Changes in chemical and physical constants during the reaction are illustrated, and the general range of properties possessed by the products made from drying and semi-drying oils is indicated. Some factory painting tests are described. Materials are of unattractive dark color, but their high chemical resistance is of special interest.[12] Von Mikusch and Mebes describe a new process by which 2-4 fatty acid molecules are obtained by treatment with a catalyst, particularly boric acid; the fatty acid molecules are unsaponifiable.[13]

Gast and others report on the preparation and properties of some copolymers of unsaturated fatty vinyl ethers with lower alkyl vinyl ethers: soybean vinyl ethers derived from soybean alcohols were copolymerized with ethyl, butyl, isobutyl, 2-chloroethyl, 2-methoxyethyl and ethylhexyl ethers in methylene chloride at –30°C, using boron trifluoride etherate catalyst. Molecular weights ranging 2,000-4,000 were obtained. The properties of each alkyl-soybean vinyl ether copolymer were studied. Copolymer films were prepared: hard, wrinkl-free, resistant to most common solvents, and 20-500 times more resistant to 5% aqueous alkali than soybean vinyl ether polymer prepared under the same conditions.[14]

According to Chatfield, the use of relatively minor amounts of dehydrated castor oil fatty acids in alkyd resins provides advantages in processing. They may increase production by speeding up bodying rate, and they appear to be more active in production of partial esters than some other compounds.[15]

Improved tall oil fatty acids are the subject of a paper by Nevin and Young. Distilled tall oil fatty acids are treated with a 0.3% zinc dust at 235°C for 30-40 minutes under reduced nitrogen atmosphere. Unreacted zinc is removed, and treated fatty acids are vacuum distilled. The end product has good color stability (Gardner value 1-2), and drying properties are considerably improved.[16] Russian work is reported in *Paint Manufacture*. Copolymerization of vinyl esters of fatty acids with tung oil or other unsaturated compounds is said to produce paint media that can replace natural oils.[16a]

The Trokenes are discussed by Pearson.[17] These are unsaponifiable filming products from non-drying vegetable oils. They are prepared from fatty acids by a catalytic action; four moles of fatty acid combine by decarboxylation to give an unsaponifiable product. These substituted pyrones possess a ring structure. The products possess high viscosity with respect to an average molecular weight of about 1,000. Drying properties and film characteristics are indicative of marked resistance to chemical agents.

Radiation

Rushman deals with the action of x-rays on drying oils and related products. Gamma-irradiation of straight-chain hydrocarbons, such as $C_{36}H_{74}$, produces polymerization. This is evidenced by increase in molecular weight, only a slight increase in iodine number, and no depolymerization to $C_{18}H_{38}$ or lower fractions. The molecular weight of *cis*-2-octadecene doubles, the iodine number remains unchanged, and a gel is produced at higher radiation levels. Fatty acid esters are essentially di- and trimerized, the saturated members increase, and the unsaturated decrease in unsaturation. Flaxseed, soybean and sardine oils readily polymerize, without change in unsaturation, have lighter color, shorter drying time, but show more turbidity and stronger odor than comparison samples prepared by heat polymerizing the same glycerides in glass at 305° in a CO_2 atmosphere.[18]

The bleaching of drying oils by ionizing radiation is the subject of a paper by Lavisse.[19]

Transesterification

Jedlinski describes transesterification of glycerides from codliver and linseed oils. Preparation of mixed varnishes containing a drying oil and a partly drying oil was attended by transesterification.[20]

Treated Oils

Teeter, Gast and Cowan discuss vinyl ethers of poly-unsaturated fatty alcohols. For several years the United States Department of Agriculture has been investigating the properties of these compounds, particularly those derived from linseed and soybean oils. Polymers obtained by cationic polymerization of these vinyl ethers show good drying properties and, when properly formulated, the films have superior adhesion to metals and resistance to alkali. A large number of polymers can be prepared from such ethers. Isobutyl-conjugated soybean vinyl ether co-

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polymers have considerable promise as can coatings, especially for black and chemically treated iron and for aluminum. They may have further application as protective coatings for appliances or automotive parts, industrial finishes for maintenance purposes, and as adhesives to bond metals.[21]

An article by Boyer, Naudet and Desnuelle deals with the influence of phosphatides on the glycerolysis of linseed oil. The first stage of the manufacture of alkyd resins based on glycerol is the preparation of monoglycerides by glycerolysis of linseed oil. The reaction, catalyzed by NaOH or sodium oleate proceeds from triglyceride via diglyceride to monoglyceride. The cephalin fraction of the phosphatides naturally occurring in linseed oil strongly inhibits the glycerolysis by inactivation of the catalyst, while the lecithin fraction is practically inactive. Additional quantities of catalyst appear to speed up the glycerolysis reaction to a desirable rate.[22]

McSweeney, Brandt and Mueller describe maleic modification of acid-refined tall oil varnishes. Formation of minor amounts of insoluble material during cooking of maleic-modified tall oil esters can be prevented by preesterification of the tall oil with polyol before maleic addition, or reaction of maleic and tall oil at 450°C until a negative dimethylaniline test for free maleic is obtained. The latter method is preferable because it is faster. Contrary to expectations, formation of insolubles is not directly related to tall abietic acid content.[23]

Cazes tells of a study made of the action of boron fluoride on drying oils (such as linseed oil) in their polymerization to stand or heat-bodied oils. The materials and procedures used are described and the results obtained are tabulated and discussed. The employment of 1-2% BF_3 as catalyst in linseed oil polymerized by heating in a closed container, under a nitrogen atmosphere and reduced pressure, permits an appreciable cut in temperature and reaction time. There is a critical temperature above which the reaction becomes exothermic. BF_3 favored the formation of trimer acids and exerted an isomerizing action, with the formation of quick-drying products. It also had a dehydrating action; the stand oils thus obtained had red to brown shades, which disappeared on drying.[24]

Drying oils treated with cyclopentadiene are the subject of an article by Poisson and Petit. The product of the reaction is a complex mixture of oil polymers, the monomer, and Diels-Alder condensates of one mole of cyclopentadiene with drying-oil polymer or monomer.[25] A related subject is dealt with by Yukhnovskii and others: copolymerization of cyclopentadiene with vegetable oils. The authors state that the films of the polymers obtained in this way have good adhesion, are stable to ultraviolet light and water, and remain elastic, hard and strong. They are recommended for interior and exterior applications.[26]

Lunina describes the kinetics of the oxidation of linseed oil by oxygen at 89.5° in the presence of catalysts (Pb and Co stearates, and dispersed metals). Co and Pb soaps increase the speed of polymerization, attaining a maximum which is determined by the concentration and nature of the introduced soap. Pb and Bi soaps also increase the polymerization. In the presence of Bi solutions, the speed of the process with respect to time also passes through a maximum, depending on the concentration of the solution. Organic solutions of metals as catalysts are less effective than the soaps, but they also accelerate polymerization. The concentration of the solution can be adjusted as so to produce the same catalytic action as the heavy metals soaps. For example, the catalytic action of 0.8% Pb solution is equivalent to the action of 0.32-15% of the Pb soap.[27]

Patents

United States patent 2,819,302 covers a process for improving the hardness of films of polymeric drying oils.[28] Bodied oxidized castor oil is patented by Nichols (to Ethicon, Inc.); the OH groups of the ricinoleate fraction of castor oil are oxidized to keto groups by refluxing a solution of the oil in an organic solvent with aluminum *sec-* or *tert*-alkoxide and a low

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molecular ketone. The product is the triglyceride of 12-keto-9-octadecenoic or 12-keto-10-octadecenoic acid or a mixture of both, depending on the time and temperature of refluxing. Bodying is achieved by heating or blowing air through the oxidized oil.[29] Synthetic drying oils are covered in United States patent 2,826,618, which describes a continuous or batch process for polymerizing refinery butadiene and styrene in the presence of sodium catalyst.[30] Polybutadiene drying oils are the subject of United States patent 2,826,621; this involves a continuous process for producing a liquid polybutadiene drying oil free from solid polymers.[31]

Gleason and Nelson patented manufacture of synthetic drying oils by copolymerization of diolefins with myrcene.[32] United States patent 2,829,064 describes preparation of a rapidly drying tung oil varnish which does not gel in the kettle.[33] An American patent issued to Peterson, Henson and Churchfield (to Dow Chemical Co.) covers interpolymers of drying-oil esters, nuclear methylated styrene, and dialkenyl aromatic hydrocarbons; these products are useful as varnish resins.[34]

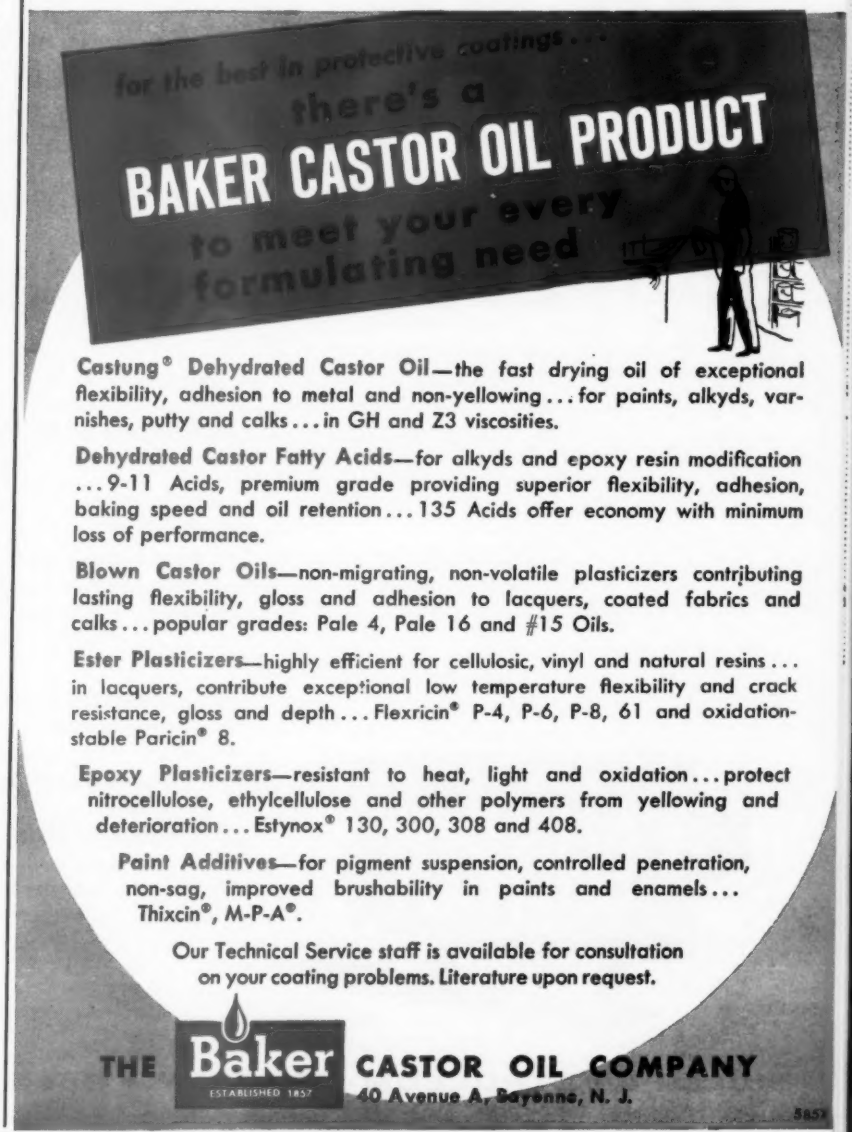
A drying oil polymer containing a phosphorus compound is patented by Canniff and Balocca (to American Can Co.)[35] Koenecke and Brady patented nitrate-liquid polymer drying oil compositions; by their process improved surface coatings are provided by baking films of a composition containing 1-100 parts cellulose nitrate and 100 parts of an epoxidized polymer oil. The blends are described as suitable for use in enamels.[36]

Young and Cottle (to Esso Research and Engineering Co.) were granted a patent for a hydrogenated polymer oil and paraffin wax. An oily copolymer of butadiene 80, styrene 20, Varsol 10, naphtha 190, dioxane 30, sodium 1.5, and isopropyl alcohol 0.3 parts by weight is allowed to react for ten hours at 40° and then hydrogenated in heptane at 250° to yield a hydrogenated polymer with an iodine number of 18. Blending 1-20% polymer with paraffin wax results in increased ASTM penetration; these oils are excellent drying oils and are useful in the preparation of varnishes, paints and enamels.[37]

A process of bodying vegetable drying oils is covered in American patent 2,843,396; this comprises admixing 2-25% of a nonvolatile oily copolymer prepared by copolymerizing 95 to 70 weight percent of a C_4 to C_6 conjugated diolefin and 5-30 weight percent of a styrene.[38] Another United States patent on the same subject calls for addition of synthetic oily polymers of diolefins to vegetable oils, to impart improved color.[39]

A process for the oxidation of castor oil comprising heating the oil in solution in an inert organic solvent and a ketone is patented by Nichols (to Ethicon, Inc.).[40]

British patent 793,575 covers polymerization and cross-linking of synthetic drying oils by ionizing radiation. Advantages claimed are elimination of high temperatures, ease of control, no catalyst contamination, and adaptability to continuous polymerization. Suggested uses include formulation of insulating varnishes.[41] Another British patent deals with esters of drying oil acids with vinyl polymers; esters of copolymers of esters such as glycidyl methacrylate and polymerizable vinyl compounds with drying oil acids- i.e., those derived from linseed oil, tung oil, etc.,- are useful in the manufacture of coating compositions.[42]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SOLVENTS AND INTERMEDIATES

Solvents

TWO developments in 1958—the increasing use of latex emulsion paints at the expense of alkyd and oil paints, and the switch by General Motors to acrylic lacquers from nitrocellulose lacquers—have affected the solvent picture appreciably. Formerly, nitrocellulose lacquers consumed large amounts of butyl and ethyl acetates and methyl isobutyl ketone while acrylics need acetone and methyl ethyl ketone as their principal solvents. If more automobile manufacturers turn to emulsion primers, xylene and toluene will be affected as these are important solvents in automotive alkyd primers which are still used extensively.

Intermediates

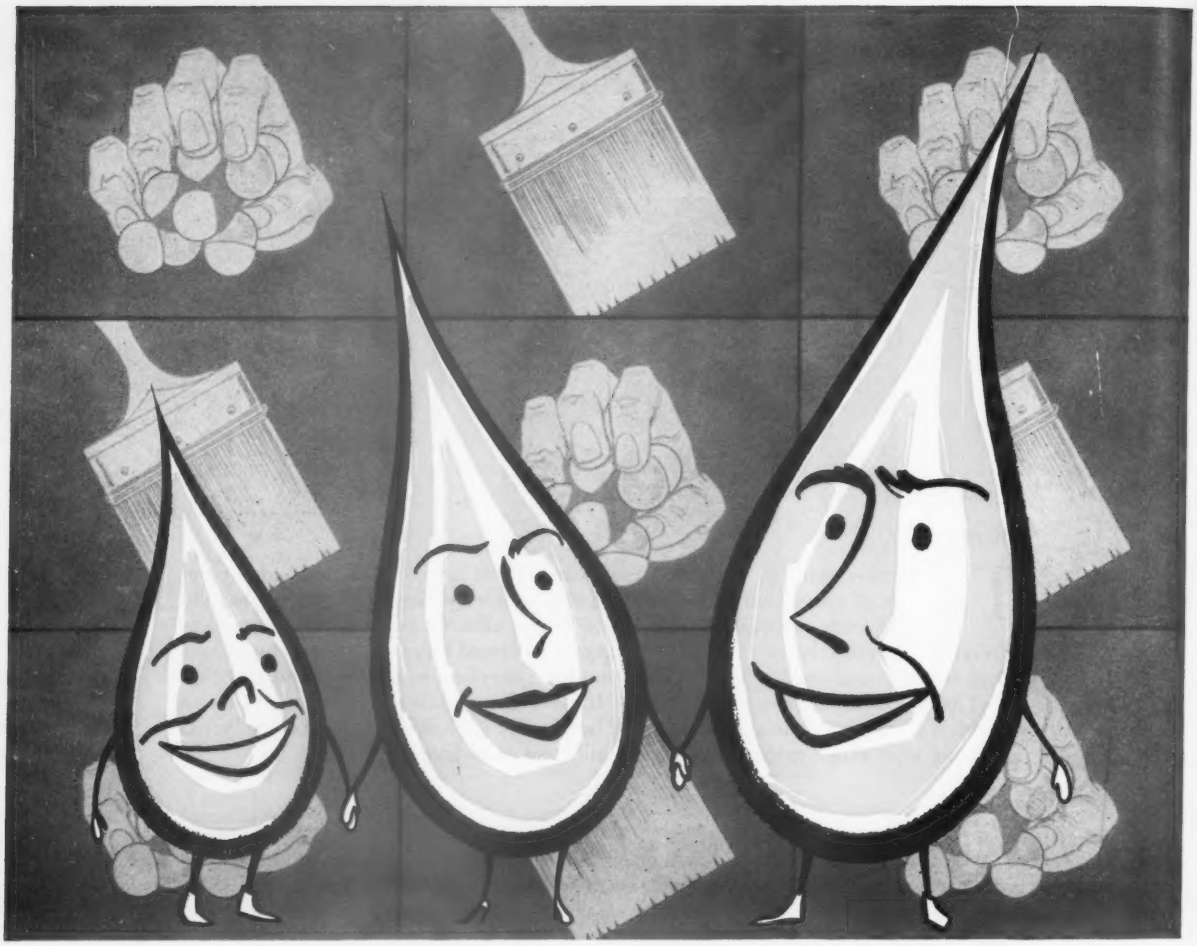
Widespread interest and attention was noted in trimellitic anhydride for synthesizing alkyd resins. Available in development quantities, this intermediate was first introduced to the paint field at the 1958 Paint Show in Cleveland. Trimellitic anhydride, a white powder, is the anhydride of 1, 3, 4 tri-carboxylic acid.

Because of its tri-functionality, trimellitic anhydride can be used to produce exceedingly long-oil alkyds. The long oil trimellitic alkyds are said to dry faster than phthalic and isophthalic alkyds of the same oil length. Films produced from long oil trimellitic alkyd are as hard as those from conventional alkyds containing 10-15% less oil. As a result, fast drying enamels may be formulated using trimellitic alkyds containing as much as 77-85% oil.

Zero-oil-content alkyds show promise in baking finishes. These are made by reacting trimellitic anhydrides with alcohols to form monoesters. The monoesters are modified dibasic acids and can be polymerized with glycols to give film forming resins, which are soluble in xylol.

Of paramount interest is the use of this anhydride to produce water soluble vehicles for baking finishes.

Other important developments in intermediate chemicals are the utilization of trimethylolethane and trimethylolpropane in alkyd vehicle synthesis to impart improved gloss and color retention, improved heat stability, improved alkali and detergent resistance, and better exposure resistance and weatherability; a resinous polyol for preparing simple esters of fatty acids which provide vehicles with such film properties as high gloss, good alkali resistance, good gloss retention upon weathering, good water resistance and good color retention in ultra-violet exposure; modification of alkyds by the incorporation vinyltoluene; PE-isophthalic and orthophthalic long oil alkyds for exterior paint vehicles; and PE and glycol as co-esterifying polyols in the manufacture of long oil oxidizing and short oil alkyds.



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Solvents

Thinners and solvents are the subject of a review article by Brown.[1] Hickman describes the selection, distillation and refining of petroleum hydrocarbons for use in coating systems; production of an odorless thinner is discussed.[2]

Liff, Rudd and Tysall reassess the concept of latent solvency, and conclude that the concept has no real theoretical basis, and is of little assistance to the formulator of cellulose lacquers.[3]

An article in *Journal of Polymer Science* reviews effects of solvent structure in polyvinyl chloride-solvent systems. The solubility of a high molecular weight PVC in a wide variety of solvents was investigated at room temperature; powerful solvents and solvent combinations for the polymers were demonstrated.[4]

A general discussion of the question of toxicity of solvents was published in the *Journal of the Oil and Colour Chemists' Association*. This reviews data made available since 1950, when A. J. Amor surveyed the field thoroughly.[5]

Gillam describes tests for the evaluation of solvents and diluents. Reviewed in his article are determination of evaporation rate of volatile materials and application of the test to investigation of multicomponent systems; and a group of solvency tests, all from the angle of sensitivity of the test to the aromatic content of a mixed hydrocarbon solvent.[6]

Intermediates

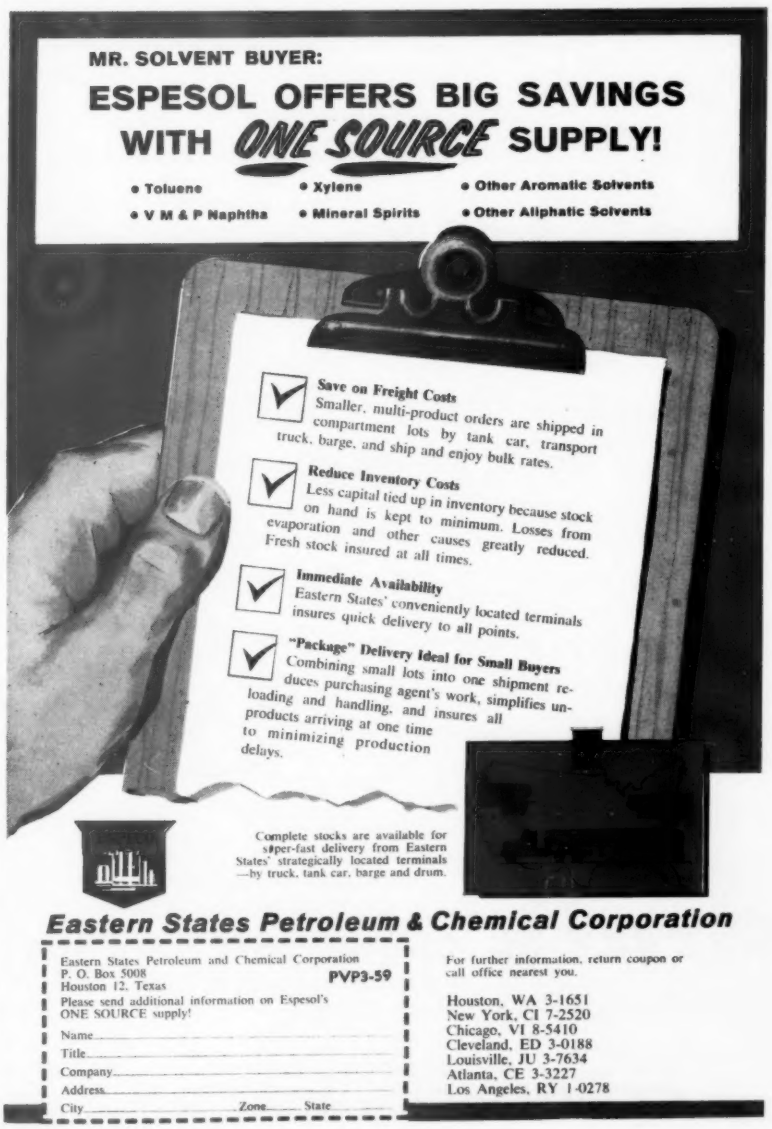
Derivatives of acrolein and peracetic acid are the subject of a paper by Sanders and others. The products they discuss are new Union Carbide Chemicals materials; some of these have properties of promise to the coatings industry: glutaraldehyde can be used as a chemical intermediate in making resins; hexanetriol can be reacted with dibasic acids to form alkyd resins, and is used to make polyesters and polyethers for urethane foams and elastomers; 3-9-divinylspirobi(*m*-dioxane) — obtainable only in research quantities—is a particularly effective cross-linking agent for polymers containing active hydrogens; epoxide-201 (also obtainable only in research quantities) is expected to find major use as an epoxy resin intermediate, as well as for stabilizing poly (vinyl chloride) resins.[7]

Chatfield writes of glycerol in paints. He points out that, in spite of the introduction of polyols, glycerol still plays an important role in many paint formulations. He reviews its use in ester gum, hard resins, long oil alkyds, polyester resins, and linseed oil processing.[8]

Some of the uses of isobutyraldehyde, and the products based on it, as well as the chemistry of the compound, are described by Gearhart.[9]

An article in *Industrial and Engineering Chemistry* is devoted to a review of present methods of producing pentaerythritol, its chemistry, the market situation, and current and projected uses.[10]

PAINT AND VARNISH PRODUCTION carries a symposium on polyols in alkyd resins. A seven-part discussion, this is a review of important polyhydric alcohols used in the synthesis of alkyds. Polyols covered are: glycerine, pentaerythritol, sorbitol, methyl glucoside, trimethyloleth-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ane, trimethylolpropane, hexanetriol, and various glycols.[11]

Brady, Johnson and Lyons review work on reactive resin intermediates, specifically describing the effects of silicone content on processing and properties of some typical coatings. The authors mention the previous scanty literature dealing with this subject, then give a detailed account of materials tested, methods of testing, and results obtained. A high phenyl content reactive silicone resin of the siloxanol type was used as the source of silicone. Silicone-organic resins were made by solvent and fusion processes. Commercial short-oil coconut and short-oil soya alkyds and epoxy resins were modified by a solvent process. Silicone-long oil linseed alkyds were made by a fusion process. Enamels made with silicone-short-oil coconut alkyds and silicone-epoxies were heat aged. Increasing the silicone content improved the gloss retention and color retention. Force-dry enamels and air-dried paints from the silicone-short oil soya alkyds show increased gloss retention with increased silicone content on Weather-o-meter aging. In all cases the craze life of clear silicone organic resin film decreased with increasing amounts of silicone. Laminates made with silicone epoxies on glass cloth had fair flexural strength after heat aging at 500°C.[12]

Describing further work on this subject, Brady deals with the modification of organic resins with various types of silicone intermediates. These intermediates can be used to improve heat stability, weatherability, and moisture resistance of many organic resins. Chemical reaction of silicones with organic resins gives superior products compared to cold-blended resins. Most commonly used intermediates are alkoxy and hydroxy polysiloxanes. Silicone-modified resins can be prepared by conventional methods in standard alkyd equipment. By varying the carbon groups on silicone, ultimate properties such as hardness, flexibility, craze life and solubility of the silicone-organic modification can be controlled.[13]

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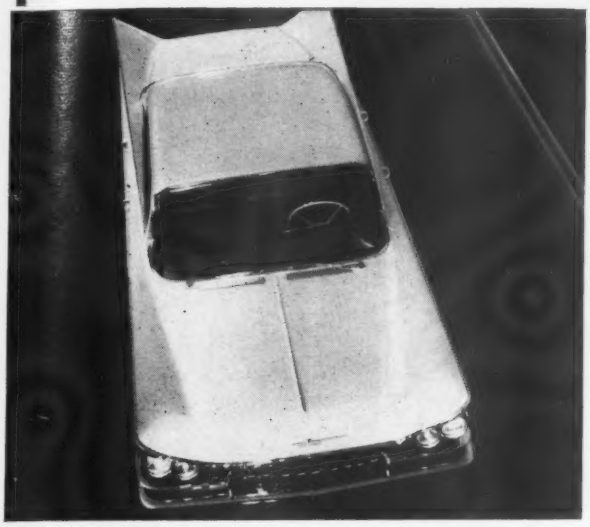

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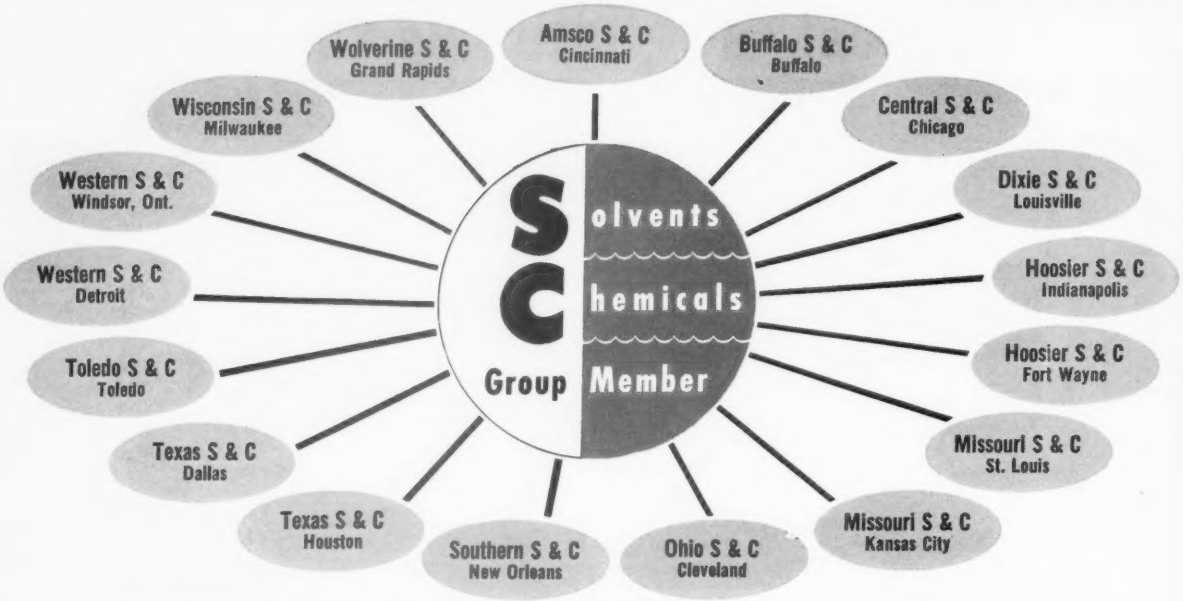

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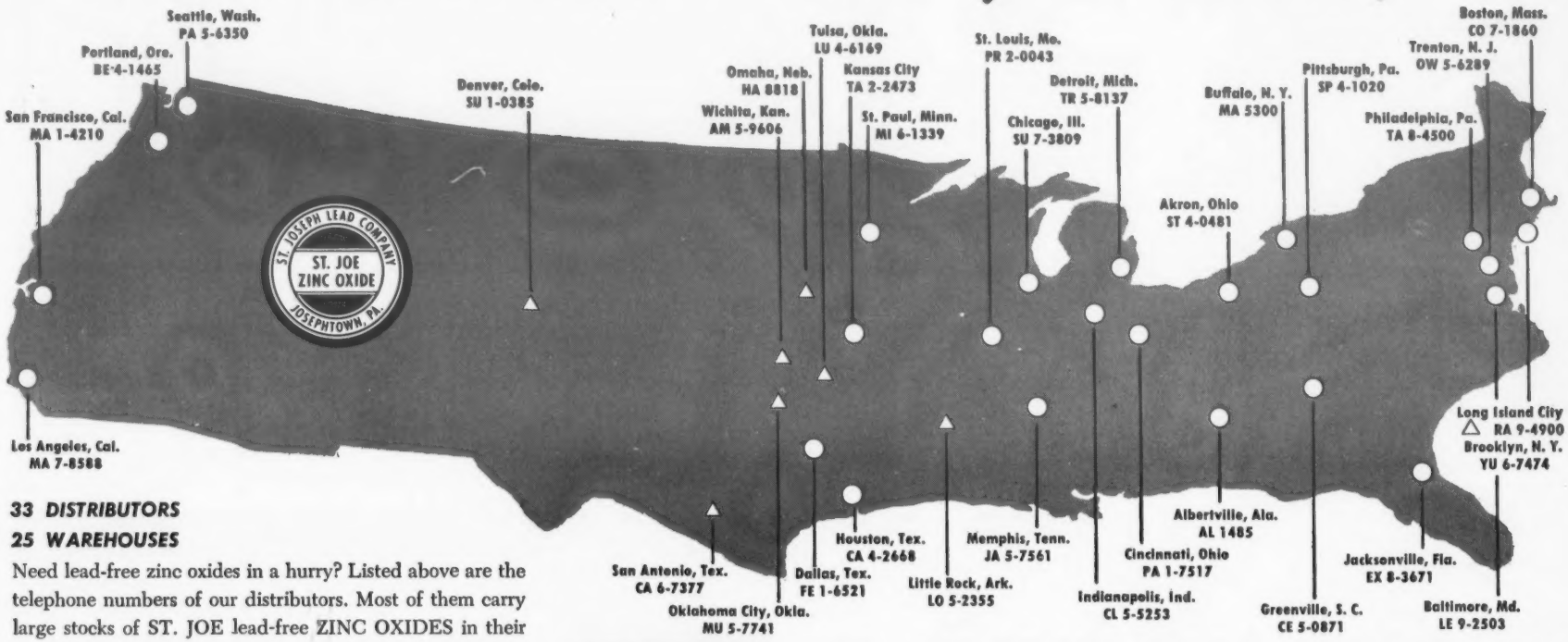

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The introduction of a lead chromate pigment for metal protective paints attracted considerable interest in 1958. This pigment consists of a silica core on the surface of which basic lead chromate has been fused. According to the manufacturer, this pigment has the proven rust-inhibitive properties of lead and chromium compounds and the weather-resistance of fused basic-lead chromate. Colored and tinted paint containing this development are said to possess unusually durable tint retention. Other developments are chrome yellows of exceptional light fastness; and a very red-shade phthalocyanine blue pigment that is crystal stable and which is said to maintain good initial bright hue and depth of color plus resistance to bleeding, good light fastness and acid and alkali stability.

A new method known as the chloride process for manufacturing titanium dioxide was put into effect last year. Titanium dioxide produced by this process is said to have the following properties: ease of wetting and dispersion in aqueous or oleoresinous vehicles when compared to the rutile sulfate grades. These pigments appear particularly suited for the water emulsion field because of their ease of incorporation into these systems, and their excellent stability in storage.

Progress was noted in the field of extender pigments during 1958. Most of these developments were concerned with the introduction of new and improved types of extenders. Of particular interest was the availability of a series of calcined clays for use in styrene-butadiene, polyvinyl acetate and acrylic emulsions systems; and a dense type precipitated calcium carbonate for flat wall paints.

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General

A detailed series by Brushwell deals with organic pigments, their chemistry and technology.[1] Varley writes about the properties required of pigments; he discusses color requirements, fastness to light and heat, and standards of performance in respect to fastness to solvents, chemical resistance, stability and dispersion.[2]

Literature surveys of pigments and colors are carried in *Paint Manufacture*; the same journal issued a guide to pigments—a review of new materials commercially available in England.[3,4]

An article by Riese discusses the pigmentation of finishes. The author gives specific recommendations for correct pigment selection for lacquers both of medium to high stability to light, heat and weather, and of high stability. The dependence of important film properties on the pigment concentration is emphasized, and the paper describes a number of pigment types.[5]

Kranz deals with ferric-aluminum reds. Best results in tests were obtained when a mixture of ferric and aluminum sulfates dissolved in water was quickly mixed with aqueous Na_2CO_3 used in less than stoichiometric amounts. Basic carbonates of iron and aluminum formed in these conditions give ferric-aluminum reds of fine particle size.[6] An article by Bonnie also considers red pigments for coatings. The characteristics of inorganic and organic reds are described: their permanence, alkali resistance, baking properties and chemical structure.[7]

An interesting article recounts the development of fluorescent paints, citing typical formulations.[8]

The question of efficient use of pigments is dealt with by Sonsthagen. His article points out that to achieve economies, it is first necessary to think in terms of the relationships between the surface area of the pigments and the volume of the vehicle or binder. The author considers this relationship in technical detail.[9]

Color and the human eye is the subject of an article which describes National Bureau of Standards' work to define color response of the eye by measuring pigmentation that affects color judgment.[10]

Whites

Grassmann and Valet describe a new photometric method for the determination of the brightening capacity values of white pigments, and contrast this method with those currently in use. No conclusions can be drawn so far on any eventual relationship between the brightening capacity, the refractive index, and other values.[11]

Titanium dioxide in PVA emulsion paints is the subject of an article by Londergan. Discussing their use in both interior and exterior formulations, Londergan concludes that, with interior formulations, titanium dioxide pigments differ in apparent water demand in PVA systems; that this water demand difference becomes evident at the higher pigment volumes for the post-plasticized polyvinyl acetate under test; that direct weight substitution of this water demand range of titanium dioxide pigments at 40, 45 and 50% pigment volume concentration shows greater dry flat hiding for the higher water demand pigments at a given pigment volume; that extender can be used to replace a portion of the binder for the low water demand rutile to show a cost advantage at equality of hiding at a given level of titanium dioxide; and that high water demand anatase provides a formulating tool to obtain dry flat hiding with smaller quantities of titanium dioxide for uses such as ceiling paints where enamel holdout, stain removal, and porosity are not critical. For exterior formulations, Londergan concludes of post-plasticized PVA emulsions that masonry surfaces, unpainted or with all excessive chalk and dirt removed, provide the best surface for the paints; that the PVA paints, like other emulsion systems, are subject to certain restrictions for general use; that PVA films require a higher percentage of chalk resistant rutile compared to conventional oil type films to give the necessary self-cleaning characteristics; that a pigment volume range of 20-35% appears to be optimum for best durability, with the lower pigment volumes showing best tint retention; and that mica, at least as a portion of the extender, combined with talc, clay or diatomaceous silica, improves the durability of PVA paints.[12]

An article by Rinse discusses lead titanate paints in Holland. Consumption of the titanate over there has reached 500,000 lbs. per annum, since the advantages of its addition to paint formulations have long been recognized. It extends the life of paints, has good gloss retention, excellent suspension and high hiding properties. On the other hand, it has a tendency to sag; this, however, can be corrected by minor changes in the vehicle, or by addition of a small quantity of magnesium or silicate compounds, or by a thixotropic agent such as the aluminum acylates. Lead titantate is also sensitive to fungi, so that fungicides must sometimes be incorporated into its formulations. Experience in Holland shows that paints incorporating the titanate are in many respects superior to classic paints.[13]

Two articles dealing with zinc oxide should be mentioned. Morley-Smith discusses (1) the photochemical activity of various types of zinc and the significance of this property in determining durability characteristics in paint; he makes suggestions to explain both the differences recorded between one oxide and another, and the mechanism by which this property may contribute towards breakdowns in the paint film; and (2) the soap-forming properties of zinc oxide; the effect of these soaps on various properties of the paint film is discussed.[14] Condi reports an analysis of the effect of particle size and shape of zinc oxide on the properties of linseed oil paints; this showed oil absorption is inversely proportional to apparent density. The latter is appreciably smaller for acicular zinc oxide than for the nodular species. Condi found that the hiding power increases with decreasing average particle size of the oxide, optimum being 0.4 mμ. The pigments with narrow scattering in particle size are superior to those with wide deviation from the mean value.[15]

Phthalocyanines

The properties of phthalocyanine pigments, and particularly flocculation of copper phthalocyanine, are discussed by Lacey, Roberts

and Giambalvo.[16] Substituted ammonium salts of *o*-carboxy benzamidomethyl phthalocyanines have been found highly successful in inhibiting floc growth (one of the great disadvantages in using copper phthalocyanine pigments). As little as one part of the salt to 20 parts of the phthalocyanine pigment inhibits flocculation and increases resistivity to crystallization. A theory for the action of these derivatives is stated, based on the formation of a solvent envelope surrounding the individual particles by a hydrogen bonding mechanism.

Herrmann writes on blue pigments, characterizing the three main types—ultramarine, ferro- and phthalocyanine. He deals with the production of these pigments, their composition and structure, and cites comparative chemical and physical investigations of their properties. The limitations in application are cited, and other blue pigments are mentioned briefly. Tables illustrate the stability of these blue pigments to chemicals, heat and other properties.[17]

Metallics and Extenders

Aluminum pigments are the subject of several articles. Scheller reviews recent developments in this area; he discusses the qualities of both leafing and non-leafing types, the refinements in their processing, and methods of closer quality control.[18] A two-part series in *Paint Manufacture* discusses production processes, properties of aluminum powder and paste; leafing and its advantages—moisture resistance, prevention of bleeding, high reflected powers, high resistance to corrosive action of salt spray—problems of formulation, uses.[19] Hartmann notes that, in Germany, aluminum pastes are gaining on the market over aluminum powders. Their pigmentation ratio is higher, in spite of the presence of some solvent. Hartmann discusses advantages of aluminum pastes, methods of testing and classifications, choice and use of solvent, considerations of purity.[20]

Le Sota deals with water-sorption of low opacity paints, reporting the effect of water sorption and describing a method of measuring it, using Brabender Plastograph. The method employs a pigment/water inversion point concept used in emulsion technology. A constant volume of low opacity pigment is titrated with distilled water, while the consistency is recorded on a Brabender Plastograph. A correlation of low opacity pigment water sorption to oil absorption is attempted. The method is recommended as a tool for evaluation of surfactants in a given pigment system, for studying optimum pigment packing, for investigating synergistic effect of multiple pigment systems, and for measuring pigment oil absorption. Sixteen low opacity pigments were evaluated. The barium sulfates, barytes, and blanc fixe have the lowest water sorption.[21]

Naylor describes the use of calcined clay in paints. Such clays are new to the paint industry, although they have several useful characteristics: their ability to impart hiding power to a paint film is most important; their rough particle shape tends to reinforce the film and increase scrub resistance in certain applications; and their high brightness is another advantage. There are disadvantages to their use: pores present in the particles may cause problems; oil absorption is comparatively high. Naylor gives some formulations.[22]

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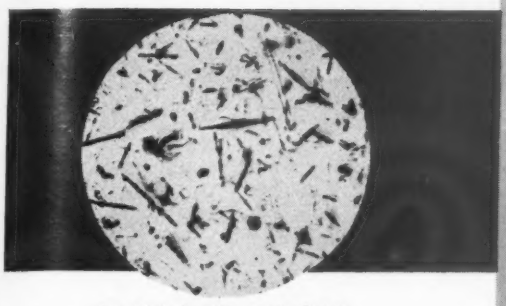

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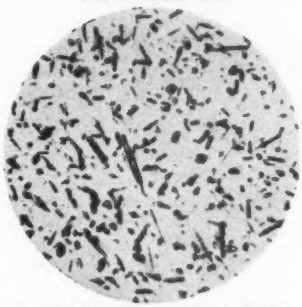

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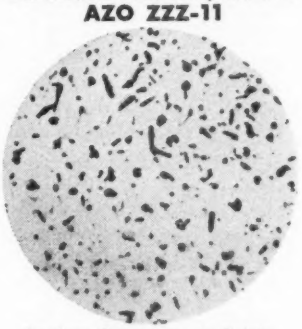

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The effects of fillers on residual stresses in coatings is the subject of an article by Inoue and Kobatake.[23] They describe the effect of fillers on the internal strains, viscoelastic properties, and thermal expansibility of the baked melamine-alkyd resin coatings. With increasing filler content, the elastic modulus and the residual stresses increase, while the thermal expansibility decreases. Graphite and talcum have a high-elastic modulus; small linear, with normal volume expansibility. Residual strain coincides with thermal strain below the second-order transition point. The thermal strain above this point and the hardening strain are frozen in the glassy state.

Kronstein and Treade discuss dispersion and tinting strength of iron oxide. In a study that shows the influence of soybean lecithin on the dispersion and tinting strength properties of iron oxide pigments in an enamel vehicle, the authors demonstrate that dispersions of iron oxides in a test vehicle vary in their color effect depending on the amount of lecithin added during milling (this is assumed to be caused by an increased degree of pigment dispersion due to the addition of lecithin). It is also demonstrated that the differences in pigment dispersion influence the tinting strength; this is done by using a constant ratio between iron oxide pigments and rutile titanium dioxides, milling the pigments under identical conditions with and without addition of lecithin and then measuring the color change values for enamels obtained. Resulting values show that tinting strength of iron oxide pigments actually increases with increased pigment dispersion and that this increase in tinting strength varies for different pigments.[24]

In an article in *Paint Manufacture*, Chatfield shows that wet-ground mica, with its unique polished laminar form, has useful possibilities as an agent for absorbing or distributing internal stresses in a coating, and for improving adhesion. An investigation into the extent of these effects and other forms of mica is reported.[25]

The same author reports the results of work carried out on dry ground, wet ground, and micronized

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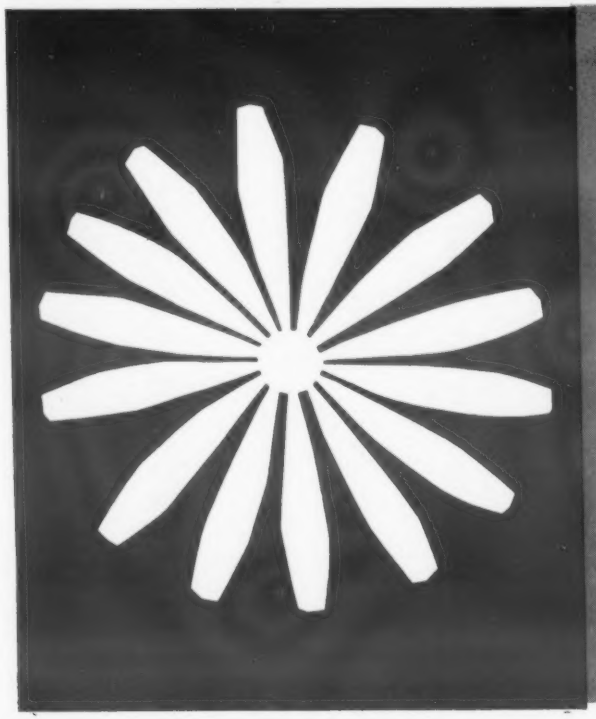

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forms of mica in emulsion paints. All paints were examined as two coat applications on glass, and assessed for durability, scratch resistance, and adhesion. Wet ground mica was found preferable for assisting rapid assumption of scrub resistance, micronized mica being superior to the dry ground form. Similarly, wet ground mica was superior to the other types in conferring improved adhesion under a variety of atmospheric conditions; the micronized mica is very slightly superior to the wet ground in maintaining scratch resistance under humid conditions; dry ground mica is inferior to the other two types. The superiority of the wet ground mica was maintained over a period of 28 days, in respect to scrub resistance; but with scratch resistance and adhesion, the differences tend to lessen on aging of the paint.[26]

Writing on water sorption of mica in latex paints, Kronstein first reviews briefly the work of Le Sota (see above), then reports his own work, tending to confirm some of Le Sota's conclusions, i. e., that an increase of water sorption of a pigment can increase the amount of water demand in a paint containing such pigments. This water sorption property of the pigment does not interfere with the film forming properties of the paint.[27]

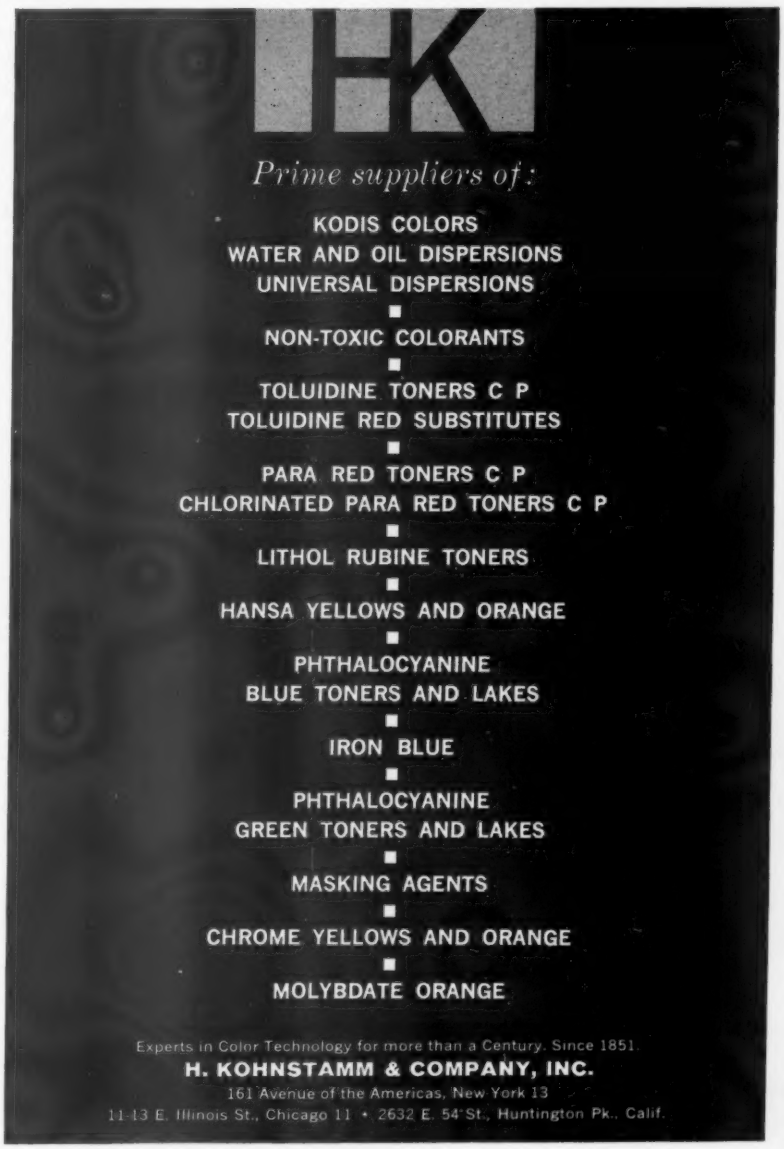
Lauren and Vander Linden discuss low refractive pigments, dealing particularly with a new class of synthetic low refractive index pigments useful in polyvinyl acetate emulsion paints. Diatomaceous silica is coverted into these pigments, which are synthetic hydrated calcium silicates unlike the naturally occurring anhydrous calcium silicate wollastonite. Formation of the hydrated silicates, known as "Micro-Cel", is accomplished via a reaction of diatomaceous silica, hydrated lime and water. Production, properties and applications of the new types of pigments are described. They are particularly notable for boosting the pH of polyvinyl acetate emulsion paints and, with long-lasting buffering action, maintaning mild alkalinity. They appear less corrosive than acidic media. Hiding power appears to be increased, both wet and dry. Flatting efficiency also seems to be increased.[28]

Special Studies and Applications

Areas of difference and similarity in the pigmentation of conventional and aqueous paint systems are discussed in a paper by Sherman. Problems in pigmentation that arise from the use of aqueous vehicles are examined in terms of knowledge of common paint pigmentation. Areas of fundamental difference, such as vehicle structure, film formation mechanisms, the effect of phase differences on color migration, and areas of fundamental similarity, such as processing equipment types, pigment to binder ratios, and important film properties are reviewed and compared. Areas of improvement for aqueous paint pigments are explored.[29]

Determination of the critical pigment volume concentration by the oil absorption test method is the subject of an article by Stieg.[30] Dintenfass deals with the rate of sedimentation in concentrated pigment suspensions.[31]

Twiss, Weeks and Thomas write on the role of pigments in the weathering of automotive paints. Effects of outdoor weathering on clear and pigmented alkyd-melamine formulations in Florida (one year) were investigated via light and electron microscopes. Twenty-eight pigments were studied. Microscopic appearance of paint surface was correlated with glossmeter readings and visual appearance. Chalking, bronzing, and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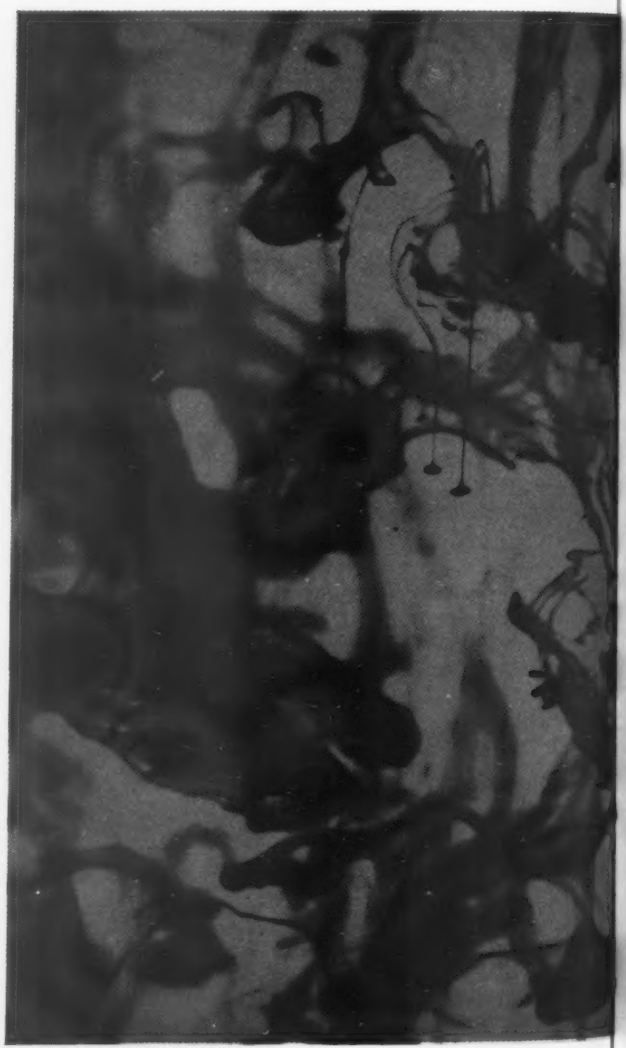

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checking were studied, and their relationship to pigmentation demonstrated. No strict relationship appeared to exist between chemical composition of pigments and type of defect associated with it. The hypothesis is advanced which states that chalking occurs when pigment particle size is greater than 0.1 microns, while bronzing results from use of pigments of size less than 0.1 microns.[32]

D'Ans and Schuster considered the significance of pigments in anticorrosive coatings. As fillers, pigments exhibit simple physical effects: they lower the diffusion rate of water and oxygen, increase the mechanical strength of the coating, and impair plasticity and elasticity. The chemically inert pigments which react with neither the paint binder, its decomposition products, the metal base, nor the atmosphere, still play a role in corrosion protection. The authors used an electron microscope to investigate certain phases of their study.[33]

The importance of pigment particle size generally is considered by Wade, with particular emphasis on micronized pigments. The advantages of these are cited: for example, it is claimed that a micronized red oxide (top particles about 2 microns) can increase output of high grade paint at least six times. No actual grinding is required; wetting is gained by turbulence; there is no waste and no mill wear; gloss is improved; there is freedom from sedimentation. Similar results were obtained with Special Greens of similar fineness, and the opacity of the paint is increased. These paints are said to approach more nearly than anything so far developed the ideal pigment size of 0.5-4 microns, which might give greatest ease of dispersion and maximum opacity.[34]

Florus and Hamann discuss the electrical charge of pigments in vehicles. Their study correlates the charge of inorganic and organic pigments in several different binders, each system dissolved in solvents of different polarity. In addition, the influence of surfactants and coalescing agents is treated. The relation between the electrical charge of the pigment particles and the stability of these suspensions is described and related to practical technical properties such as degree of dispersion, gloss, hiding, easy brushing, leveling and optimum pigment volume.[35]

Taylor deals with the optical properties of pigments in the near infra-red, concluding that the optical properties of paint films can be largely attributed to the pigments present. The applications of surface-coating techniques to the fields of thermal insulation and camouflage, and the use now being made of radiant heating in the curing of industrial finishes, have resulted in a need for information on the optical properties of pigments in the near infra-red. Taylor describes methods of measurement, and presents optical data for a range of pigments, obtained from spectrophotometric measurements on paint films within the 700-900 mμ waveband. The information acquired is applied to the formulation of camouflage shades, illustrated in B. S. 987C, possessing infra-red reflectance characteristics similar to those of green vegetation.[36]

Dunn attempts an optical classification of pigments and coatings in a detailed explicative article, discussing most of the optical properties of pigments, and describing methods of measuring them: via refractive index, gloss, hiding power, tinting strength, etc.[37]

A more specific study is that of Hall and Bozeman, who made an evaluation of various pigmentations to develop a high quality alkyd at most economical cost. They describe their methods of testing, and give a number of formulations, and conclude that one master flat formula is still far from realization.[38]

Calcium plumbate in priming paints is the subject of an article by Read. Its properties as an anticorrosive pigment (first reported in 1950) are briefly noted. Its commercial use confirms its value for protection of iron and steel. The chemical behavior of the pigment in linseed oil is examined. Although lead and calcium salts exist in the dry paint film, only calcium compounds are extracted by water, yielding solutions of pH 8-9. The effects of lead and calcium compounds on film formation, and the influence of the water-soluble calcium compounds on the behavior of calcium plumbate oil paints are discussed. The use of calcium plumbate in quick-drying and stoving dipping paints is described.[39]

Andrianov and Fromberg report on the effects of pigments and catalysts on the heat-aging of poly (methylphenylsiloxane) coatings. The thermal oxidative destruction of the siloxane, which contains alternating spatial and linear links, proceeds with a break-off or organic radicals on the Si-C bond and the destruction of the Si-O chain bond. Catalysts used to accelerate the drying of the poly (methylphenylsiloxane) lacquer films intensify the destruction and the thermal-aging processes.[40]

The action of lead pigments and lead soaps on aluminum is detailed in an article by Pryor, Hogan and Patten.[41]

Patents

Pugin (to J. R. Geigy, A. -G.), patented tinctorially strong, nonflocculating phthalocyanines; these are incorporated in a liquid pigmenting composition.[42] United States patent 2,833,782 describes a method for the conversion of crude copper polychlorophthalocyanine into pigments.[43] Chlorinated phthalocyanines are the subject of another United States patent; yellow pigments were obtained.[44]

A process of making wet aluminum pigment containing non-leafing aluminum flake particles in contact with water is patented by Knoll and Hurd (to Metals Disintegrating Co.)[45]

Tanner patented improved titanium dioxide pigment, prepared from a washed titania hydrolyzate containing phosphatic, Cr, Fe and V impurities.[46] A water-dispersable talc for use as a pigment is prepared by grinding the talc with a small amount of nonionic wetting agent; this process has been patented by Lamar.[47]

British patent 790,949 covers preparation of a zinc ferrite pigment; this is of light color, with good pigment compatability, and free from contamination with water-soluble salts. It is made from a homogeneous aqueous slurry of Fe_2O_3 by heating the dried mixture in the presence of a catalyst.[48]

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DRIERS AND ADDITIVES

WHILE naphthenic acid continues in poor supply, the amount of naphthenate drier available has been limited to some extent. However, there is enough naphthenate drier to meet present demands of the paint industry. This demand is, if anything, decreasing, due to the inroads of the water-thinnable paints, which use little or no drier and to the fact that other types are driers are being used to a greater extent. These include octoates, tallates, and oleate-linoleate driers. The new oleate-linoleate driers show great promise because of their excellent stability and low odor, making them ideal for odorless paints. Zirconium type driers which are said to also improve the film properties of the paints are gaining interest among paint manufacturers.

The demand for fungicides and preservatives is increasing due to the steady growth of water emulsion paints and the increasing use of lead-and zinc-free paints which are quite prone to mildew attack. Although a great deal of effort is being placed to develop non-mercurial products, the most effective and widely used antimicrobials continues to be the phenyl mercury compounds. Phenyl mercury oleate remains the most satisfactory for solvent-based paints, whereas phenyl mercury acetate is the most widely used preservative-mildew inhibitor for water-based paints.

The paint formulator has learned to use additives, not to correct an occasional batch that goes wrong but as basic raw materials to give coatings specific properties. Thus, if a formulator has a coating that is low in viscosity, he simply adds a small amount of bodying and puffing agent. This increases the viscosity without the necessity of having to reformulate with a different pigmentation or a different vehicle. This reformulation might affect his gloss, levelling, brushability or other properties.

The upsurge in water thinned paints has spurred the use of water thickeners, sequestering agents, emulsifiers, freeze-thaw stabilizers, anti-foaming agents, and pigment dispersants, wetting agents, etc. During the past year a number of these additives were made available for use in emulsion paints.

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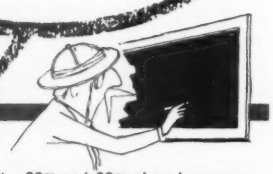

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Aluminum Compounds

An article by Turner, Kemp and Harson deals with the function of aluminum complexes as structure-modifiers for paint. The authors point out that the mechanisms of addition substitution by which aluminum attaches to organic compounds (particularly compounds of interest to the coatings field) are not clearly understood. They review past work on the subject, and describe a series of experiments of their own intended to clarify certain details. The various structuring reactions are considered, and factors affecting these reactions are discussed.[1] The mechanism of gelation of vehicles by aluminum soaps is described by van der Reep.[2] Heierman writes on the application of organic compounds of aluminum in paint vehicles.[3]

Driers

Allen surveys the function and mechanism of drying. Drier systems, metals used as driers, synergists, drier form, stability, factors affecting drying time, test methods, are all covered. The comprehensive series of articles is based on laboratory research and a review of the literature.[4]

Asking the question: do the drier metals work? Williamson describes tests in which methyl linoleate was used to study the functioning of lead and cobalt in drying-oil systems. Lead was found to promote oxygen uptake but with no polymerization under 40°C. Cobalt was found to act as both an oxidation and polymerization catalyst. A polymerization mechanism involving formation and decomposition of hydroperoxides is suggested.[5]

Kuhn and Haas discuss the hardening of casein dispersions by formaldehyde. Paint containing casein can be made less hygroscopic by the use of aqueous 30% formaldehyde. This is not, however, practical. Experiments were undertaken to add formaldehyde in chemically combined form (dibutylacetal) to the dispersion film in sufficient quantity to harden the paint. The authors were unable to split the acetal in such a way as to liberate sufficient formaldehyde for a complete drying-condensation reaction with the casein; further work is in progress.[6]

An article by Stearns and Canty describes a detailed investigation of "Activ-8" (1, 10-phenanthroline is the active ingredient) when incorporated into styrene-butadiene latex paints, using scrub-resistance as criterion. It is concluded that the product promotes the drying of such paints.[7]

Thickeners

Jubilee evaluates twenty thickeners for their thickening ability, scrub results, brushing, leveling, pH and enamel holdout. It was found that methyl cellulose and hydroxy ethyl cellulose possess a combination of overall properties that makes them well suited for use as thickeners in vinyl emulsion paints. Carboxymethyl cellulose is comparable, but has inferior water-resistance. Propylene-glycol alginate and ammonium alginate have good overall properties, but their reported pH and heat instability render their use inadvisable. Ammonium polyacrylate shows promise as a secondary thickener because of the improved leveling properties it imparts.[8]

Bailey, Powell and Smith write of Polyox; it is possible that these high molecular weight polymers of ethylene oxide may have some application as thickeners in water paints.[9]

Titanates

An article by Chatfield deals with the influence of titanates on paint properties. According to the author, the indications are that, in alkyd based paints, butyl titanate assisted gloss retention in propertion to the concentration, that it retarded color fading, and that it inhibited chalking. The known antioxidant effect of the titanate was also investigated for its effect on skinning; the butyl titanate was observed to control skinning in proportion to the amount of titanate present. As a disadvantage, it was noted that, in some cases, butyl titanate increases the tendency to yellow, which would exclude its use in white and delicate pastel shades. But the compound possesses useful antirivelling properties. Tests were made of the effect of the titanate on the viscosity of some paints, and it was found that a heavier retained coating is obtained as butyl titanate concentration increases, a "bonus" effect, so to speak. The author considers the properties of titanates as plasticizers; oleyl titanate has a noticably more pronounced plasticizing effect than the cyclohexyl titanate and smaller additions were necessary. Stoving time experiments indicated that titanate plasticized coatings, in practice, would require more extended stoving time than the combination of melamine and alkyd resin. It is concluded that both oleyl and cyclohexyl titanates can be useful plasticizers with etherified urea resins in place of the normal alkyd resins, for industrial stoving finishes.[10]

The same author discusses organic titanates as dispersing agents. Earlier work had indicated the usefulness of butyl titanate in assisting pigment dispersion in drying oil media. In the present article this research is carried forward, using a more representative range of pigments and extenders, and different types of grinding media. Several formulas using varnish linseed oil, with butyl titanate, are given. The value of the titanate as a wetting agent is shown particularly with burnt umber, rutile and anatase titanium dioxides, china clay and vegetable black. Butyl titanate has already been shown to be useful with carbon black, iron oxide (natural) and water ground mica. A reduced, but still useful, effect, was found with middle lead chrome, cadmium red, and antimony chloride; only a slight advantage was observed with barytes. With Hansa yellow, the effect appears initially disadvantageous, but as the duration of grinding increases, an overall improvement is noted. The reverse is true with burnt sienna. With acicular zinc oxide, red and white leads, mid Brunswick green, prussian blue, Monastral blue and micaceous iron oxide, butyl titanate was either ineffective or disadvantageous. Some of the pigments or extenders used in the varnish linseed oil noted above were tested in a linseed stand oil medium and in a long oil linseed penta alkyd medium. Results indicate that the beneficial effect of butyl titanate

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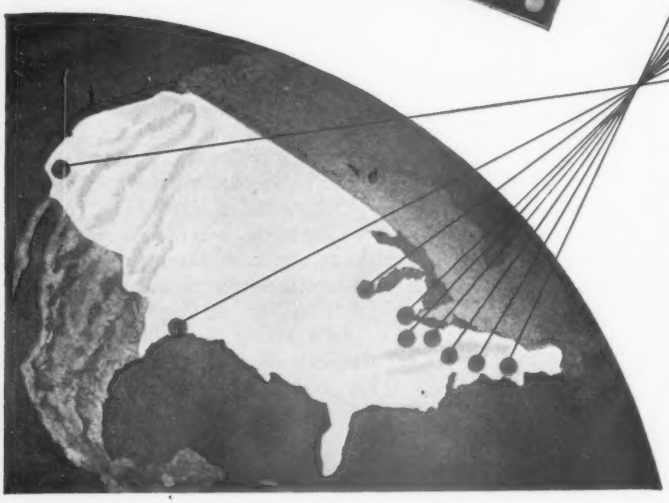

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appears most general in straight unbodied oil media, although promising results in special cases are also probable with stand oil and alkyd resin media.[11]

Sidlow describes recent developments in organic derivatives of titanium. The use of titanium-esters as antioxidants, as gelation promoters, and as pigment dispersing aids is covered. There is a summary of uses outside of the surface coatings field.[12]

Plasticizers

Magne, Mod and Skau write about *N*-disubstituted amides of long-chain fatty acids as vinyl plasticizers. Preliminary tests of morpholides of certain fatty acids as plasticizers show favorable efficency, compatability and brittle point, but somewhat inferior heat resistance. *N*-disubstituted amides of the major individual and mixed component acids of cottonseed and peanut oils were prepared and subjected to a preliminary screening evaluation as primary plasticizers for vinyl resins. The morpholide of oleic acid, the unsaturated fraction of selectively hydrogenated cottonseed or peanut fatty acids, and the partially epoxidized morpholide of the unsaturated fraction of cottonseed acids were found to exhibit excellent plasticizer characteristics, tempered to a degree by their questionable thermal stability. Equally satisfactory morpholide plasticizers can also be made from many other vegetable, animal and fish oils by applications of the principles and treatments described.[13]

Miscellaneous

Nonionic surfactants in paints are the subject of an article by Gantz and Sumner. The applications of surfactants as emulsifiers with reference to emulsion polymerization, latex stabilization and latex formulation are reviewed. Their use in pigment systems is noted. The article places particular emphasis on alkyd phenol-ethylene oxide condensation.[14]

An article by Singley and others discusses isophthalic sulfonyl compounds as a new class of dibasic acids for alkyd resins. The authors prepared several isophthalic sulfonamides and an isopthalic sulfone; these dibasic acids were mixed with isophthalic acid and converted into polyester and alkyd resins. It was found that incorporation of small quantities of an isophthalic sulfonyl compound increases the rate of esterification. Varnishes were made from the alkyd resins. It was observed that presence of the isophthalic sulfonyl compound in the varnish decreased resistance of the coating to boiling water and increased surface hardness and drying time.[15]

Miller discusses the action of ultraviolet screening agents in organic coatings. The durability of polymers is directly related to the amount of ultraviolet light absorbed; this depends on the incident intensity. Reducing effective incident intensity, and thus improving durability, may be done via incorporation of ultraviolet screening agents. The protective action of these agents can be approximated mathematically; the anticipated increase in service life will be determined by the ultraviolet spectra of the additive and of the organic film, the concentration of additive, and the film thickness. The author shows that these additives are more useful for thick than for thin films, for clears rather than for pigmented coatings. The screening agents will produce greater relative effect when used with polymers of low absorptivity and high quantum yield for degradation. Polymers which absorb strongly in the ultraviolet

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will show much less relative improvement.[16]

An article in *Oleagineux* reports a comparative study of some commerical antixoidants in France. The main antioxidants were studied, with respect to linseed-oil ethyl esters (carefully distilled and free of any natural antioxidant). The autoxidation tests were followed by iodometric determination of the peroxide numbers. The materials and procedures used are described, and the results obtained are tabulated, plotted and discussed. Nordihydroguairetic acid, hydroquinone, pyrogallol (at a rate of 0.01%) and Metophan (at the rates of 0.1% and 0.05%) proved to be excellent antioxidants.[17]

Holderried writes of fire retardant paints; flame-resistant additives such as glazing agents, intumescent agents, and chain-ending agents are described briefly. A number of compounds were tested. It is concluded that brominated organo- and brominated-organo-phosphate compounds are the "most rewarding" approach to the solution of the problem.[18]

Self-sanitizing paints are discussed by Klens. According to the author, a triazine compound has been found which has the desired activity, stability and non-toxicity for self-sanitizing paints. The reduction of viable bacteria and fungal spores on painted walls containing the agent is demonstrated in a number of paint systems. Areas of utility for these self-sanitizing coatings are food plants, hospitals and certain areas of homes.[19] (On this subject see also the paper of Klens and Koda, below.)

Patents

A plasticizer for resins was patented by Sprang and Webster (to Emery Industries, Inc.); this is an esterification production of (a) two mols of a fatty oil acid containing from 6 to 18 carbon atoms and (b) from 4 to 8 mols of a dicarboxylic acid selected from the group consisting of adipic acid and azelaic acid, with (c) a substantially molecular equivalent amount of a glycol selected from the group consisting of propylene glycol and dipropylene glycol.[20]

United States patent 2,821,514 covers a fire-resistant composition, containing at least one alkali metal silicate, a rubbery polymer and a refractory.[21] A mildew-resistant paint is the subject of another American patent; this consists essentially of a pigment including ferri-ferrocyanide, copper naphthenate and a vehicle.[22]

Drier accelerators are patented by Myers and Zettlemoyer (to The Harshaw Chemical Co.). These comprise a soap of a metal (iron, lead or manganese), and an aromatic tertiary amine.[23] Kronstein (to Oakite Products, Inc.) patented a procedure for solubilizing metal accelerators.[24] A liquid-rust prevention composition is covered in United States patent 2,856,299. This comprises an oleoginous base, a partial ester of a fatty acid, and an aliphatic polyhydric alcohol.[25] Another rust-preventive composition is patented by M. J. Furey (to Esso Research and Engineering Co.)[26] This comprises a method of blending cut back asphalt base thin film rust preventive compositions with a minor, but viscosity stabilizing, amount of a wax amine.

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Microbiology

The *Official Digest* printed a series of papers presented at the Second Annual Seminar of the Louisville Paint and Varnish Production Club, on March 4, 1957.[27] The first of these papers, by Goll, deals with microorganisms in relation to organic coatings. It describes procedures employed in one industrial laboratory in an attempt to standardize the testing of microbial deterioration of protective coatings. Isolation and identification of microflora on exterior oil paints is the subject of the paper by Rothwell. The results of isolations and identifications of the microorganisms found on different exterior oil paint films exposed on test fences for six months or longer at Memphis, Chicago, Miami, San Francisco, Wilmington and Sayville, New York, are discussed. Analysis of results indicates that one or more species of four molds generally should be regarded as the important group or groups occurring on exterior oil paint films; these are *Pullularia, Cladosporum, Alternaria, and Phoma.* Other species of bacteria were also isolated; and it is suggested that some of these may also be causative factors in deterioration of the paint films. The third paper in the same symposium is that of Ross. This reports the types of deterioration of painted surfaces by microorganisms; the literature on the subject is reviewed, and there is a detailed consideration of the role of linseed oil as a source of nutrition by microorganisms (this point is disputed in the literature). Tests designed and carried out by Ross were intended to determine the degree and manner of attack of linseed oil and linseed oil films by microorganisms. Both unpolymerized linseed oil and polymerized linseed oil were studied. Results of the tests indicate that linseed oil can serve at least partially as a nutritive source for microorganisms commonly isolated from panels painted with oil coatings. Wiese discusses can film preservation; the use of preservatives in emulsions, particularly latex emulsions, for shelf and film stability is reviewed, emphasis being on protection against microbial attack. Eisenschiml writes of preservatives in industrial maintenance coatings. A comparison is made of the characteristics of phenyl mercurials and copper-8-quinolinate from the point of view of properties desirable in fungicidal protective coatings: toxicity to man, odor and taste, color, stability to heat, effect on material to which applied, cost, resistance to leaching. Klens and Koda discuss self-sanitizing paint surfaces. The "cidal mechanisms", desirable properties of additives, test methods are described. "Self-sanitizing" means a marked reduction in number of organisms on treated surfaces without necessarily killing all organisms or even all infectious organisms. The authors conclude that incorporation of such an agent into paint films offers a practical means of controlling bacteria and fungi, in such areas as hospitals, food plants, bathrooms and kitchens. The final paper in the symposium is devoted to an evaluation of fungicides for use in paints. It details test methods developed by the Corps of Engineers, field evaluation of hundreds of fungitoxic compounds (Shapiro).

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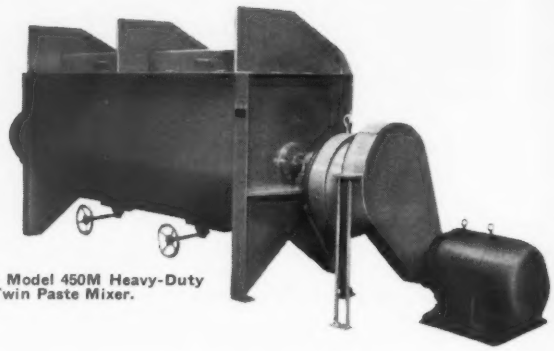

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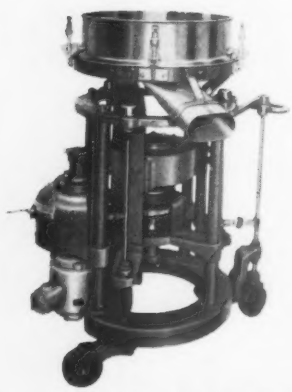

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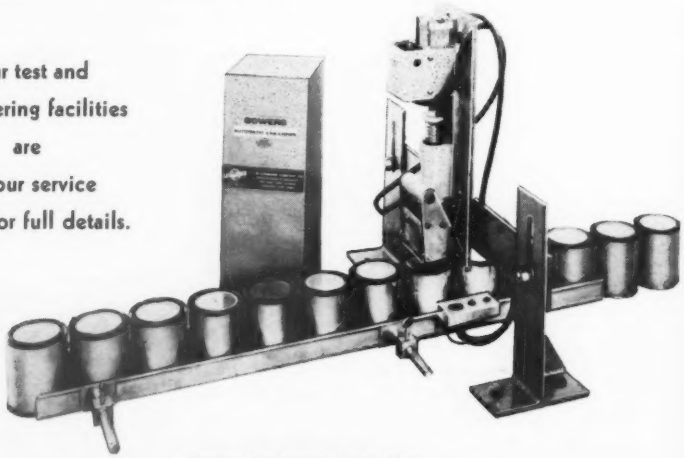

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PRODUCTION

SAND milling or sand grinding caused considerable interest within the paint industry as a new method for dispersing pigments during the past year.

The sand grinder is basically different from any other process mill under discussion today. Operation does not depend upon intense shearing action of the vehicle phase, or upon cavitation effect, or upon impact of media. Closely packed sand media operates similarly as a hydraulic jack; the hydraulic driving force transmitted from a rotor to a fluid is collected by sand particles in the 700 micron range and impressed upon much smaller pigment particles.

The sand grinder is a simple machine, with no unusual parts and is recommended for top quality industrial finishes, lacquers, flat finishes, and in whites demanding low gray-off. Production rates range from 50-300 gallons per hour of paste, or an average of 125 to 150 gallons per hour in an 8-plus titanium dioxide base.

Among the new pieces of equipment offered to the paint industry during 1958 were changeable can mixers incorporating double planetary stirrer action and featuring vacuum tight covers; a high speed dissolver for mixing batches from 50 to 200 gallons and recommended for dispersion, dissolving, emulsifying and deagglomerating processes; a multi-stage dispersion mill is said to offer improved method for wet milling and grinding, homogenizing, dispersing, and emulsifying; mixer featuring whirling-blade design with 360 degree screen area and is said to speed up mixing, color-blending, dispersing, dissolving, etc.; "claw" type propeller for intensive mixing which is claimed to be effective in mixing products that have a tendency to agglomerate; split-level mixer designed for high density and high viscosity chemicals; scroll for sieving machine is said to be a time saver in sieving applications and also effective in continuous operations; tankless horizontal plate filter requiring minimum of floor space; electrical heating system for phthalic anhydride; and paint can with solderless clinched ears is said to provide accident-proof handling.

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Operation and Maintenance

An article by Shatkin, in PAINT AND VARNISH PRODUCTION, points out that an analysis of production activities is one way of increasing production in the paint plant. The author suggests methods of obtaining data on manufacturing processes, and discusses two departments in detail: shading and labeling.[1] Fair writes of some of the problems of redesigning plant layout.[2] Two literature surveys on plant and equipment were published in *Paint Manufacture*.[3]

The operation of the Durez plant in North Tonawanda, New York, is described by Littler.[4] Heating systems for resin and varnish manufacture are the subject of a review published in England: using Dowtherm, a system was developed that raises the efficiency of the boiler 80%. Temperatures up to 370°C ± 1-2°C are possible. Temperature control is automatic.[5] Varnish fume nuisance is discussed by Webb. The principal source of objectionable fumes and odors in varnish and enamel manufacture is the "cooking" operation. Several ways of combating these fumes are briefly noted by Webb, and the use of an ejector-type fume scrubber is considered in detail.[6] Processes special to the manufacture of paint pose some specific pollution problems; these are reviewed, with suggested solutions, in a second article by Webb.[7]

An article in *Paint Manufacture* reviews materials handling in paint plants, suggesting ways of improving service.[8] A system of handling materials in the Paints Division of Imperial Chemical Industries, Ltd., is described in PAINT AND VARNISH PRODUCTION. The system is said to save space, move products automatically, and speed orders.[9]

Strahl surveys the handling of small orders in lacquer plants; means of prompting the customer to place large-scale orders, such as moderate price increases on lower-volume orders, etc., are cited. The author emphasizes that a decrease in the number of small orders leads to economy.[10]

Weed considers reduction of spray painting costs, with particular reference to planning of a paint department.[11] Squirrell and Jacob, writing about labor utilization in a paint factory, analyze manufacturing techniques and suggest improvements.[12]

Manufacturing Procedures

An article in *American Paint Journal*, covering paint formulation by volume, is particularly valuable for two tables, one showing the volume of non-volatile vehicle calculated for PV 20-50, the other the volume of volatile thinner in the vehicle calculated for 10-50%, both based on one gallon of pigment.[13] Bobalek gives a detailed review of procedures and problems in formulation with thermoplastic resins; one of the interesting features of his article is a table of comparisons of water and solvent paint formulations.[14] A detailed bibliographical review of polymerization procedures was published in *Industrial and Engineering Chemistry*.[15]

Filtration methods in the paint industry are the subject of a symposium published in the *Offical Digest* of the Federation of Paint and Varnish Production Clubs. Edge and depth type filters, filter aid selection and application, pressure filters and electrolytic and mechanical filtering screens are considered in detail.[16] A self-scavenging filter press (produced by D. R. Sperry and Co.) is cited by Johnson.[17]

Machinery

An article in *Farbe und Lack* describes in detail the machines and apparatus exhibited at the 12th ACHEMA Fair; included are centrifuges, filters, etc., of German origin. Technical and production data are appended.[18]

An article by Oeckel describes a friction-resistant cast basalt lining in ball mills; it has been successfully tested in the preparation of highly sensitive lacquers.[19] Bosse writes of the "sand grinder". He describes the development, and the application problems encountered in ten years of work with this low-cost milling equipment, which provides strong dispersive and mill grinding action, and is useful with a considerable range of products.[20] Shatkin discusses high density grinding media for improved dispersion and increased production in ball mill.[21] High density aluminum

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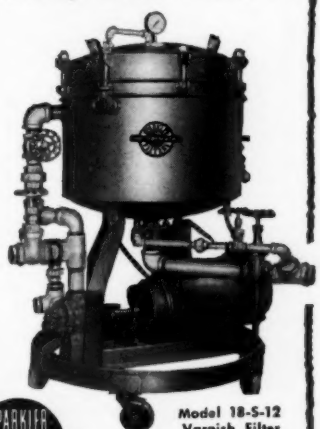

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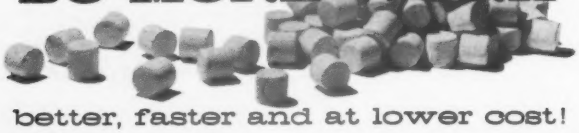

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oxide cylindrical media for paint grinding are described by Vajda.[22]

Pigment Dispersion

Carr and Astbury review pigment and dispersion in detail. The degree of dispersion in a pigment in a system cannot be satisfactorily measured, and is not yet fully understood. For the formulator, particularly of plastic emulsion paints, this fact poses difficulties. The authors review pigmentation of aqueous, emulsion and non-aqueous systems; the important role of pigment pastes and the high degree of development they have undergone are considered. It is the conclusion of Carr and Astbury that any major future advances in pigment dispersion in aqueous or non-aqueous systems can be brought about only by alteration of the texture of the pigments themselves.[23]

The wetting and dispersing action of liquids on powders is discussed by Mardles. A criterion of the degree of wetting action of a liquid for a solid (for example, a paint pigment), is given by the rheological properties of its dispersion of the finely divided solid. Good wetting action is accompanied by low relative viscosity, comparatively low rate of settling, etc., and on the other hand poor wetting is indicated by high relative viscosity and yield value, thixotropy, and other rheological phenomena. In many respects, this rheological criterion is more convenient and reliable than deductions made from measurements of contact angles, adhesion tensions, heats of immersion, spreading coefficients, etc., which may be misleading. The author discusses the effect of water, time required for wetting, flocculation, yield value and thixotropy, approach and recession of dispersed particles, Jamin effect, appraisal of wetting action, influence of dispersing liquid on viscosity, and adhesion strength of flocculated particles.[24]

Kocian writes of pigmentation of coating materials and printing dyes; the dispersion process he describes permits the preparation of pigmented paint materials and printer dyes without grinding or milling.[25]

Reporting data on pigment dispersion with high-speed impeller equipment, Guggenheim describes a simple turbine type of impeller turning with a radial speed of 4500-5000 feet per minute. A formula for determining an oil absorption factor on any vehicle is worked out, to give the ideal consistency paste:

$$F/c = .90 + \frac{V.S.}{145} + \frac{P}{40}$$

The author says this formula has been useful as a timesaver and control.[26]

Weisberg discusses dispersion behavior of "jet milled" pigment, i. e., the preparation of a wash primer with minimal grinding. The "grinding" he describes is not a crystal fraction process, but one involving reflocculation and wetting.[27]

Color Matching

A modified Munsell Technique is the subject of an article, in which the practical problems involved are discussed in some detail, including such factors as color surrounding colored object observed, the texture being matched, quantity of light falling, phenomenon of color fatigue.[28]

Two articles on color-aptitude testing and results should be noted. Tilleard details a critical evaluation of the test developed in the United States in 1944 and produced in its final form in 1953. The records of about 300 persons tested were analyzed at the Paint Research Station, Teddington, England. The author's conclusion is that "results from the analysis confirm largely the statements made about the purpose and function of the test, and what might be expected from different groups of observers, and suggest that the color-aptitude test should be a very suitable sorting test to be applied to trainees in color matching."[29] Adams considers results of 200 tests using the I.-S.C.C. test set. His conclusion is that "the test does, in fact, measure the ability of the candidate to see small differences of color and to decide when two colors are an accurate match."[30]

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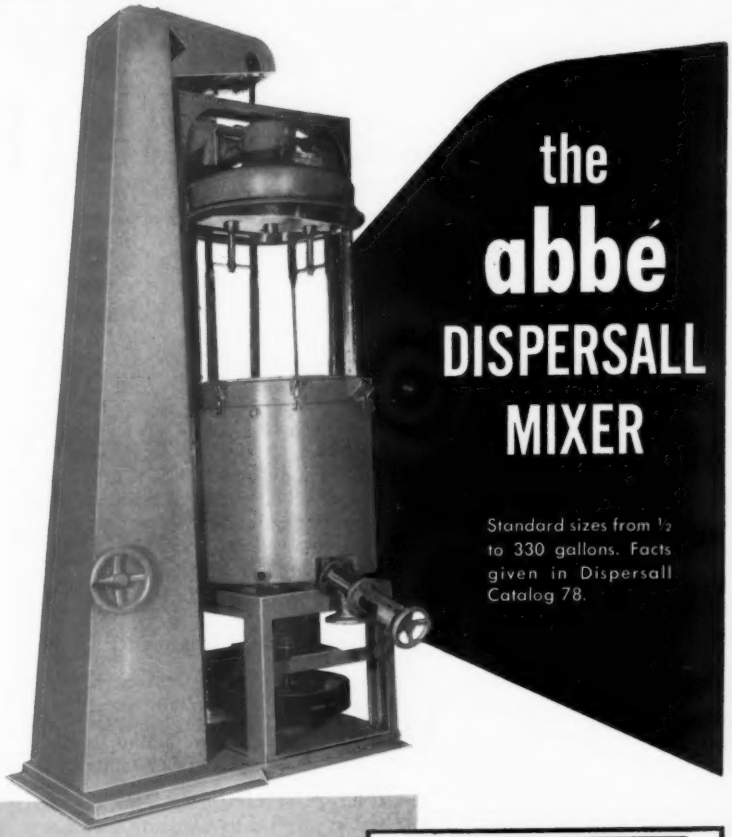

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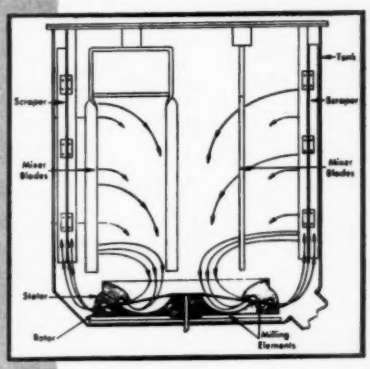

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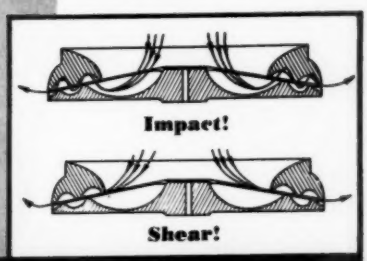

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SEPTEMBER —Painting for Safety — an integral feature of "Industrial Maintenance and Safety Issue".

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INDUSTRIAL COATINGS

ARCHITECTURAL COATINGS

CORROSION

APPLICATION

AEROSOLS

PERHAPS the most significant development in industrial finishes was the announcement by General Motors in late 1958 that all of its passenger line will be finished with new acrylic lacquer. This new finish is said to eliminate much of the usual car waxing and polishing. In addition, these finishes have shown good color fastness on outdoor exposures. One big advantage of the acrylic finish is that they may be applied in a period of only four hours, an important feature in assembly line production. By contrast both Ford and Chrysler have adopted the high melamine content alkyd finish for most of their 1959 models. In the way of automotive primers, both the styrene-butadiene latex emulsion system and the epoxy emulsion have created some interest among paint manufacturers. The epoxy resin emulsion is an ester based on a high molecular weight resin and unsaturated vegetable acids. This ester is cut in xylene and pigmented with iron oxide in the presence of a variety of emulsifying agents. Water may be added to obtain spraying viscosities, but the formulation has a flash point of 185 deg. F. due to the presence of xylene.

An appliance finish based on a cross-linked vinyl copolymer vehicle made quite a sensation last year. Developed by Canadian Industries Ltd., this appliance coating is said to combine the adhesion and ease of application of alkyd-based enamels with the rich gloss of vitreous. It resists detergents, chemicals, heat, and moisture, and is effective in hiding sand scratches or metal textures.

Other important developments include epoxidized soybean oil finishes with excellent corrosion resistant properties; nitrocellulose lacquer formulated with epoxidized oil exhibits improved adhesion and better cold check resistance; a line of heat resistant coatings based on silicones; and day-light fluorescent paints for aircraft to prevent air collisions.

In the way of application, solvent-free epoxy system can now be sprayed by a machine which can accurately proportion the solventless resin with catalyst and produce a continuous film. Advantages of the solvent free application are reduced fire hazard during application; elimination of pinholing sometimes caused by solvent release; thicker coatings per pass of spray gun.

A combination of vapor degreasing of metal parts with painting by flow coating is said to be safer, faster, and more economical than present methods. This new approach makes use of the same nonflammable-solvent trichloroethylene for both cleaning and painting. Work enters at one end, is cleaned and painted, and comes out at the other end free of trichloroethylene thinner.

INDUSTRIAL COATINGS

An article by Marino reviews developments in the organic finishing field during 1957.[1] A summary by Pollay describes the properties of the most commonly used materials.[2] Oxx discusses the problem of choosing the proper coating for high temperature work.[3] The properties and uses of catalytic coatings are considered Howe.[4] A bibliographic survey of protective coatings, largely of 1957, appeared in *Industrial and Engineering Chemistry*.[5]

An interesting article by Baur details the history of lacquer and lacquering techniques in China and Japan.[6] The magazine *Paint Manufacture* carries a literature review of lacquer, citing recent material.[7]

Price, Langland and Boller discuss water soluble resins for industrial finishes, particularly Arolon 304 and several Arolon 304 primer formulas. Properties of the resin solution and clear films are noted, as well as salt spray resistance, water resistance, and other characteristics of gloss enamels and automotive type primers. High pigment binding power and excellent film continuity combine with the crosslinking feature of the polymer when cured to give finishes with good salt spray, water and solvent resistance.[8] An article by Broughton reviews the properties of water base industrial finishes.[9]

Kern discusses hot lacquers and factors that affect their use. As product finishing materials, hot lacquers have the advantage of possessing (1) high film thickness applied per pass of spray gun; (2) superior non-sagging properties; (3) excellent non–blushing characteristics; (4) superior flow and leveling.[10] The blushing of nitrocellulose lacquers is considered by Liff, Tysall and Watkins. Their article describes a device for controlling humidity conditions during spraying, to enable investigation of blushing under conditions free from supervenient moisture.[11] An automotive lacquer based on half-second butyrate is discussed in an article in PAINT AND VARNISH PRODUCTION. The properties of the product (made by Eastman Chemical Products, Inc.) are noted and formulations employing it are given. The half-second butyrate, pigmented lacquer is said to show outstanding weathering durability compared with conventional lacquers now in use.[12] A literature survey covering recent data on lacquers appeared in *Paint Manufacture*.[13]

An article in *Farbe und Lack* deals with the kinetics of lacquer resins in the electrostatic field, adducing the Maxwell theory. The lacquer band was investigated both in a free fall and in an electrostatic field. The kinetics of lacquer particles and the decay of the lacquer band form a basis for an estimate of a purely electrostatic dispersion; the latter depends on the dielectric constant. The possibility is discussed of determining the dielectric constant, the dipole moment, and (indirectly), the electrostatic dispersion from the chemical constitution of a compound. The article describes practical experimental work on various types of synthetic resins.[14]

In the same journal, Zonsveld discusses solvent-free lacquer systems based on epoxy resins and amines. Fundamentals of the hardening, and application methods for lacquers prepared on low-molecular epoxy-resin and polyamide bases are reviewed. Tentative formulations show the direc-

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tion of future developments. The paper enumerates the advantages of solvent-free lacquers, especially with respect to application.[15]

An article in *Paint Manufacture* deals with "Epigrip" epoxy resin based paints for marine and industrial use. The two-pack coatings are said to be well established, and in successful use in chemical works, plating shops, foundries and other industrial premises, particularly where the need is to provide protection against the corrosive attack of chemicals or solvents in high vapor concentrations or in actual contact with the surface due to spillage.[16]

Writing on plastic coatings on metals, Besson observes that such coatings have the effect of merging their own chemical, physical and mechanical properties with those of the base to which they are applied, thus taking a more active part in the whole system. Besson's article (condensed from an ealier paper in *Plastiques Modernes.*) is a general review of the advantages of plastic application to metals and methods of use.[17] Champion describes the painting of aluminum and its alloys. The characteristics of the unpainted metal are reviewed; in particular, its corrosion-resistance properties. For a wide variety of alloys and conditions of exposure, it is unnecessary to paint aluminum for protection; however, at certain times and with certain alloys, painting is desirable. Preparation for painting, choice of system, and application are discussed.[18]

Hirt, Piech and McCord deal with recent developments in air dry metal finishes based on nitrocellulose and chlorinated rubber. The main object of their detailed paper is to show how nitrocellulose and Parlon chlorinated rubber can be formulated into coatings to meet the demand for fast air-drying finishes with a very high degree of gloss retention. The performance properties of nitrocellulose-acrylic ester resin, Parlon-acrylic ester resins, and Parlon-nonoxidizing alkyd resin lacquers are described. These properties include,—in addition to gloss retention—ease of pigment dispersion, pigment suspension, gloss as sprayed, resistance to high test gasolines, and resistance to synthetic lubricants for aircraft finishes. Work relating to short-oil oxidizing alkyds designed to be compatible with Parlon is also described. Product finishes based on such combinations have been explored and they offer interesting properties: speed of dry, adhesion to unprimed metal, and chemical resistance.[19]

Keck discusses the effects of beta irradiation on a typical metal finish. An automotive or appliance vehicle composed of 75% coconut alkyd (Beckosol 931-60) and 25% melamine (Beckamine 3555-60) was subjected to irradiation. Film casting and irradiation procedure are described, and effects of the irradiation on pigment color change, film hardness, and film gloss detailed. Results are summarized: specular gloss was increased over that of a comparable baked finish; film hardness was increased; surface polymerization was promoted; pigment color was altered for certain formulations; Sward Rocker slippage was induced with certain systems; crocking (crystal growth) associated with certain tints when baked could be eliminated by subsequent irradiation; electron photomicrographs indicated that film degradation after 350 hours in the XW Weather-OMeter was less when irradiated than when baked.[20]

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the subject of a paper by Shur. He reviews the materials used—resins, oils, polymers, etc.; the properties of these materials; their processing and application; the measurement of film density; pigment-to-vehicle ratio; catalyzed finishes; production methods; paint systems.[21]

The properties of Cyzac Resin 1006 and Cyzac Resin 1007 are investigated in a detailed article by Tropp. These American Cyanamid Company products, first of a series of new heat convertible nitrogen-derived surface coating resins, were incorporated into two enamel baking formulations, and their characteristics compared with melamine resin-alkyd formulations. The enamels containing Cyzac Resins were found to be highly stable, and to bake to finishes with unusually good flexibility to hardness ratios, high gloss and gloss retention, and improved solvent and chemical resistance. Formulations based on the new resins also have excellent exterior durability.[22]

Discussing latex paints for industrial finishes, Carpenter, Cipriano and Skory note that styrene/butadiene latexes measure up to, or surpass, commercial solvent paints as industrial finishes on metals. Their paper details the advantages of such paints: non-flammability; low odor; non-irritating vapor; absence of costly thinner loses; minimiziation of smog problem. The authors cite special end uses, with suggested formulations.[23]

Johnson discusses improvements of formulation in furniture finishes, and describes a number of materials now commercially available.[24]

Design of heat-reflective paints is the subject of a paper by Tompkins and Tompkins. The theory of light-scattering by fine particles is applied to the general design of paint coatings for the reflection of thermal radiation. Commercial white pigments are demonstrated to be unsuitable for the reflection of infra-red radiation. With titanium pigments of larger particle size, however, reflectivities as high as 98% appear possible. Silicon carbide and high-purity silicon are shown to have outstanding potentiality as pigment material for this application: optical absorption in vehicles is discussed with emphasis on the new polyhalo ethylenes.[25]

Brewer and Sevick discuss the frictional electric charge of a paint spray, reporting on the influence of certain variables on the observable electric charges of a spray. An electrically insulated target, a set of standard resistors and an electronic amplifier are used to measure frictional electrification accompanying formation of a "spray". Variation of resistance, of height, of distance, and of air pressure-paint ratio were examined. It was found that paint droplets which land on target act as a constant amperage source within the limits of the experimentation.[26]

An article in *Peintures, Pigments, Vernis* reviews the light reflection characteristics of coatings containing small spherical glass beads.[27]

The derivation, properties and applications of protective coatings based on bitumen are discussed by Stanford.[28] A review article by Bottcher describes the properties and uses of asphalt, bitumen, and pitch lacquers and bituminous paints.[29] Payne deals with the problem of the cracking of asphaltic concrete adjacent to traffic stripes. Five traffic paints were sprayed on asphalt test panels for relative rate of penetration. Results of the test indicate that a major factor in cracking of road adjacent to traffic stripes is the large difference in cohesive strength of the two areas: road and traffic stripe.[30]

Glaser and others write of epoxy latex coatings for the metal litho industry.[31] Mankova and Janiga describe the use of synthetic resins as coating materials in the wine industry in Czechoslovakia.[32]

Adhesives

Industrial and Engineering Chemistry published a detailed symposium on recent advances in adhesives.[33] The symposium consists of six papers. The first (by Bockhoff, McDonel and Rutzler) deals with the effects of oxidation on adhesion of polyethylene to metals; it is found that relatively small degrees of oxidation can considerably improve adhesion values encountered commercially in fluidization and flame spraying. The second paper (St. Clair and Moult) discusses room temperature-cure resorcinol epoxide adhesives for metals; these adhesives can be used for bonding structural parts of aircraft where heat and pressure are not easily applied, where heat-curing distorts metal structures, and in field repair of damaged airplanes. Trivisonno, Lee and Skinner, in the third paper, report on adhesion of polyester resin to treated glass surfaces. Glass surfaces were treated with some 60 finishing agents or combinations of agents, chosen for their ability to form a primary chemical bond between the glass and unsaturated polyester resin, or good adhesion to glass and plastics. A simultaneous study was made of the electrostatic phenomena that occur in adhesion and account for a portion of the adhesion forces. The next article in the symposium—that of Black and Blomquist—describes metal surface effects on heat resistance of adhesive bonds. Work was directed toward establishing probable causes and mechanisms for the deterioration of adhesive bonds in metal bonds at temperatures up to 550°F. The observations presented, although empirical, may suggest new leads to the aircraft and other industries for development of adhesives for metals with improved thermal resistance. The next paper is that of Alter and Soller. It deals with molecular structure as a basis for adhesion and ultracentrifugal measurement of the adhesion of epoxy polymer. The final report (Taylor and Rutzler) discusses adhesions using molecular models, particularly adhesion of polyethylene and poly (vinyl chloride) to metals. To learn how to select the most suitable adhesives for use on a given metal surface, scale models of molecules of high polymers and metal surfaces (titanium, stainless steel, and iron) were prepared and fitted together, and the adhesive force was calculated for various combinations. The geometric arrangement of adhesive molecules on metal surfaces has a strong effect on the adhesive forces between the two. Calculated adhesive forces based on the maximum number of interactions are much greater than experimental values.

Patents

United States patent 2,819,983 (Salo, Clarke and Gallagher to Eastman Kodak Co.) patents wood-finishing lacquer systems; a three-coat wood-lacquer system is based primarily on cellulose acetate butyrate.[34]

Fire-resistant coating compositions are the subject of United States patent 2,821,514.[35] The compositions consist of 12-52% of one or more alkali metal silicates, 10-34% of a rubbery polymer of a butadiene hydrocarbon and acrylonitrile, 21-74% of an insulating refractory, and sufficient water to make a tacky workable dispersion. They can be readily applied to steel, wood, etc., and on drying form fire-resistant coatings that have insulating properties. The coatings are adherent, impact-resistant, and show little or no crazing. Very thin coatings will protect base materials for some time at temperatures of about 4000°F.

United States patent 2,821,523 deals with wrinkle drying coating compositions containing fatty-acid esters of methyl α-D-glucoside.[36] Lowell (to E. I. Du Pont de Nemours & Co.) patents a coating using methyl methacrylate resin, said to provide excellent adhesion of the topcoat to the metal surface.[37] Haas (to Glidden Co.) patents a material for preparing uniform hammer finishes that contains 10-60% vinyltoluene, 0.1-2.0% divinylbenzene, and 13-65% alkyd resin, in addition to catalyst, stabilizer, drier, aluminum pigment and/or pearlescent fish pigment and solvents.[38]

A process of coating a vitreous surface with powdered luminescent material is the subject of United States patent 2,824,814.[39] Huntsberger (to E. I. duPont de Nemours & Co.) covers an aqueous coating composition comprising water, colloidal polytetrafluoroethylene, and 10-85% by weight based on the polytetrafluoroethylene of water-soluble alkali metal silicate together with colloidal silica, the ratio of the silicate being between 25:75 and 90:10 by weight.[40] A method of manufacturing a coating composition suitable for application without heat is patented by Sturm (to Cosmocord Plastics, Ltd.); the procedure employs polyethylene and polyisobutylene.[41]

An aluminum dipping enamel, which does not leave streaks and blemishes on dipped articles, and which is smudge-resistant, is the subject of United States patent 2,827,388. It is prepared from an alkali metal-catalyzed, solvent-polymerized, hydrocarbon drying-oil vehicle.[42] Werner and Longstroth (to Sterling Drug Inc.) patent stabilized varnishes containing a varnish and a nitrophenylazo pigment, and including benzotriazole, whereby the composition is stabilized against discoloration by contact with iron in the presence of small amounts of water.[43] United States patent 2,838,414 covers a protective composition for roofs, metal surfaces, etc., in which are included as essential ingredients and in intimate admixtures, coal tar, powdered aluminum, ground asbestos, gypsum, and lead oxide.[44] Sackett patented a glyceride oil-varnish resin can coating.[45] Soap and water-resistant films are covered in United States patent 2,842,451; when applied to paper, wallboard, or wood, and evaporated, this coating left a film of high reflectance.[46]

Primers for vinyl-resin coating are patented by Gollub, Wood and Berberich. The compounds com-

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prise a mixture of methyl methacrylate and epoxy resins in an organic solvent ratio of methacrylate to epoxy resin of between approximately 15:85 and 99:1. The coating is also bonded by applying the primer and the volatilizing solvent, applying the vinyl-resin dispersion, and heating the dispersion.[47] Murphy patents a ready-mixed aluminum coating composition and articles coated with it; the coating is prepared by mixing extra fine aluminum pigment in an oleoresinous vehicle containing esterification products of (1) resin acids, (2) a mixture of higher fatty acids, and (3) an esterifiable polyether resin. The coating is carried out on a heat-resistant substrate cured at 300°F.[48] A heat-resistant enameling paint containing silicone resin is patented by Kornbluth.[49] Polyhalocarbon-resin compositions are the subject of United States patent 2,844,557; the baked-film coatings consist of a polyhalocarbon resin and a nonpolyhalocarbon resin and a nonpolyhalocarbon resin compatible with it. The resultant coatings give good coverage of irregular surfaces and good bonding.[50] A metal primer for use with methyl methacrylate coatings is patented by Evans and Pappalardo.[51]

United States patent 2,851,370 covers a pearlescent coating composition comprising a water-insoluble film-forming lacquer and mica having a particle size ranging from 1 to 100 microns, in which composition the pearlescent pigment to binder ratio by weight is from about 3:1 to 7:1.[52] Stephens (to Pittsburgh Plate Glass Co.) patented a lacquer composition consisting essentially of nitrocellulose, a solvent, at least one phthalocyanine pigment, and from 0.2 to about 7.0% by weight of benzyl cellulose; the composition is characterized by its non-flocculating and non-striating properties after preparation, and after extended periods of storage.[53] Fluorescent compositions comprising a polymerized infusible resin, a fluorescent dye dissolved in the resin, and a transparent vehicle, have been patented by Switzer, and Switzer (to Switzer Brothers, Inc.)[54] United States patent 2,853,397 covers a process for manufacture of improved organic dyestuff colored lacquers using N-substituted urethanes.[55] Schuster and Baldi (to Kelsey–Hayes Co.) patented a method for improving the surface of corrodible ferrous metal by etching it with nitric acid and applying on the etched surface an aqueous chromic acid solution having a concentration of from ½ to 10% by weight, and drying the chromic acid solution on the surface.[56] Another patent covers an aqueous coating composition, containing as the sole resinous components from 75-85% by weight of a reaction product of a glyceride oil fatty acid and an alkyd esterification product of a polycarboxylic acid and a polyhydric alcohol.[57] A composition for use in treating articles having a phosphate coating is patented by Tuttle, Vittands and Walsh (to Second Bank-State Street Trust Co.); it consists essentially of a water soluble stannous salt and a water-soluble aliphatic polyhydroxy acid.[58]

Protective coatings for metals are patented by Shreir; these comprise phosphoric acid of 1 to 8 moles concentration, and at least one tannin material in a proportion of between 1 and 35% by weight.[59] A method for phosphate coating of metal is the subject of United States patent 2,854,370.[60] Coating compositions for metal surfaces are covered in a patent issued to Shotton and Edwards (to Phillips Petroleum Co.); these comprise a liquid polymer and polymeric material (rubbery polymers).[61]

British patent 791,806 covers a paint consisting of sodium silicate and/or potassium silicate, Al_2O_3, $Ca(OH)_2$, and/or $BaSO_4$, a pigment, and a vehicle; the paint can form a coating effective as sound-deadening panels for plywood and cork.[62] British patent 795,497 covers a metal-coating composition showing excellent wedge-band characteristics and adhesion; it is prepared by incorporating in a liquid polymer of a conjugated diene 0.5-1.5% weight % of 2,2,4- or 2,4,4-trialkyldihydro- or tetrahydroquinoline; the products are useful for coating food containers.[63]

Annealing lacquers are patented in Austrian patent 198,858.[64] These consist of a low-molecular resol carboxylic acid, a plasticizer resin, and 1 mole OH groups per 200-400 g., a strong water-soluble inorganic or organic nitrogen base, water or a mixture of water with compatible organic solvents as diluent.

Furniture varnishes and polishes are patented in USSR patent 109,708. These are prepared with a collodion wood rosin base. To improve their spreading qualities and their resistance to atmospheric moisture, a high-boiling volatile substance (hydroxyterpene solvent) is added.[65]

Miura and Igarashi patent an insulating varnish. This comprises a mixture of maleic anhydride 0.8, phthalic anhydride 0.2, and diethylene glycol 1.05 mole; in a stream of nitrogen this mixture is heated at 170-190° for 8 hours with stirring. Then, to 100 g. of this polymer are added styrene monomer 60, gilsonite 40, and hydroquinone 0.1-0.01 g.[66] Japanese patent 5135 (1958) covers a paint for rubber. Natural rubber is mixed with xylene, and heated; then benzoyl peroxide is added, followed by further heating, when the product is mixed with sulfur, painted on rubber and heated at about 125° for an hour, to give the painted product.[67]

ARCHITECTURAL COATINGS

The fundamentals of formulation of interior architectural paints are reviewed by Stieg.[1] He points out that the important considerations in establishing a basic paint formula are *volume* relationships: pigment volume concentration, percent total solids, effective PVC. These relationships follow an orderly pattern from enamel to flat, and from one vehicle system to another. It is suggested that the average compositions derived from this pattern are superior to "out-of-the-file" stock fomulas as starting points for formulation and testing work. Methods for arriving at basic formulas for various types of finishes at predetermined hiding-power levels are described.

Kraft and Roberts discuss alkyds in architectural paints. They cover choice of proper alkyd for interior and exterior uses, formulations, production techniques, and characteristics of the various com-

ponents and finished paint systems.[2]

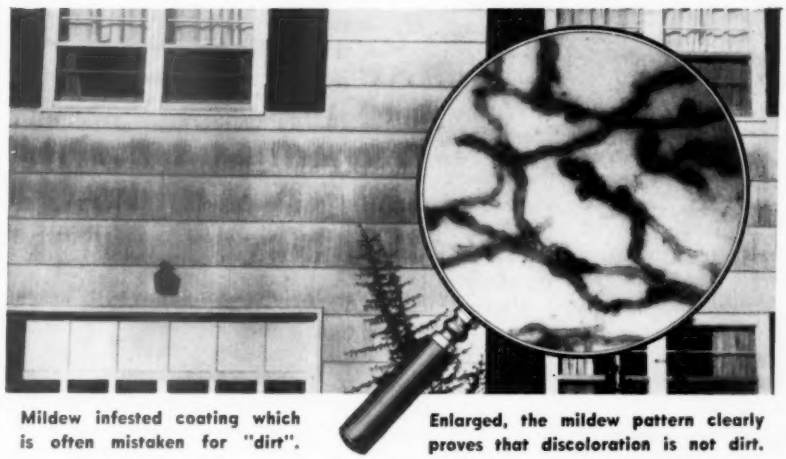
Polyurethane architectural finishes are the subject of a paper by Bieneman. These polymers are obtained by reacting diisocyanates with hydroxyl-bearing materials—vegetable oils, polyesters, polyethers. Relatively new, they possess interesting characteristics: water and corrosion resistance, weather resistance, alkali resistance; high gloss and gloss retention. On the other hand, the polyurethanes are relatively expensive, and are not entirely color stable, under certain conditions. In addition, they are in many cases two-can systems. Bieneman's article is concerned primarily with one-can stable vehicles.[3]

Whitford writes of exterior primers and special paint systems for wood. His article presents data to establish the role of the house paint primer as a foundation coat for exterior paint on wood, and discusses the primer's importance in relation to film integrity and decorative value of the two-coat paint system. Large-scale exposure testing has substantiated the use of special primers are reviewed by Whitford; he also considers the performance of both synthetic vehicles and emulsion systems as exterior wood finishes.[4]

A study by Brand, Deibert and Mueller covers the effect of particle-size range and distribution of micaceous talc extender on the gloss of outside house paints. For purposes of study, the ground talc was separated into fractions of limited particles size, and these fractions were incorporated into exterior house paints. The results of tests indicated that the particle-size range of extender materials has an important influence on the gloss and viscosity of exterior house paints; that very small extender particles cause a large decrease in the gloss and an increase in the viscosity; that very large extender particles also cause a drop in the gloss of the paint, but give a slightly lower viscosity; that, in the case of micaceous talc, the optimum particles size range is from 7-30 microns in diameter, and that best results are obtained by removal of both fine and coarse particles beyond this range. Also, the distribution curve is important; but further work is needed to determine the optimum shape of this curve.[5]

An article by Bitting, Brand and McSweeney deals with the effect of tall rosin on the yellowing of interior enamels. Purpose of the study was (1) to compare rate and amount of yellowing when vehicles were modified with different types of rosin (wood and tall oil from an acid refined material), and (2) determine amount of tall oil rosin that can be added to a soya oil alkyd without perceptible yellowing. Work shows that rosins of different sources have essentially the same rate of yellowing: a soya-type alkyd can be modified with about 10% rosin before objectionable yellowing occurs in a relatively fume-free area. Rosin appears to retard yellowing in a high-fume area—i. e., a kitchen. Therefore, a more uniform rate of yellowing should be expected of interior enamels made with a soya-type alkyd modified with about 10% rosin.[6]

Weathering properties of white lead and zinc oxide paints are reviewed by Rischbieth and Bussell. Their article reports work done in Australia, covering five years' outdoor weathering of three-coat painting systems derived from all possible combinations (as primer, undercoat, and finish) of



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linseed oil pigmented with white lead and zinc oxide, used singly and mixed in two proportions. Procedure and formulations are described, and results analyzed. The authors' conclusion is that the priming paint for oil-paint systems pigmented with white lead and chalk-resistant zinc oxide should contain a higher proportion of white lead than of zinc oxide; white lead as the sole pigment is satisfactory. The presence of both pigments is desirable in the finishing paint, but it is best that the zinc oxide content exceed that of the white lead. Zinc oxide as the sole pigment is but slightly inferior to such mixed-pigment paints, but white lead alone gives a finishing paint of greatly inferior performance. In three-coat painting systems, it is desirable that both pigments be present in each coat, but white lead should predominate in the primer and undercoat and zinc oxide in the finishing coat.[7]

Becker, Horback and Merkel describe a series of exposure tests, extending over a year and a half, which indicate that the aromatic family of solvents (notably toluene and xylene) can be used in quantities of 10-25% with a commercially available polyvinyl acetate emulsion, and that the resulting compositions formulated into exterior paints exhibit excellent adhesion to chalky and dirty surfaces and, in addition, retain highly desirable clean-up properties with water. The polyvinyl acetate emulsion system uses conventional exterior emulsion formulations based on a commercially available polyvinyl acetate emulsion which has proved its durability for over two years in exposure tests. Thus a system has been found whereby a polyvinyl acetate exterior paint can be modified with minor quantities of a common solvent to give a product which exhibits all the desirable characteristics of the original emulsion paint and also gives excellent adhesion to chalky and dirty surfaces.[8]

CORROSION

Wash Primers

Recent developments in wash primers are the subject of a study by Roth and Kellert.[1] They describe thermosetting wash primer modifications, and the action of the resulting materials under various top-coats and on various substrates. A phenolic resin modification was found to possess the greatest range of effectiveness. Water resistance greatly improved over that obtained with the usual Government specification primers was achieved by suitable thermosetting resin modification. The use of wash primers under air dry as well as baked top coats was investigated.

An article by Beck reviews the fundamentals of wash primers, including their composition, properties, and applications.[2] Allen discusses mechanisms of action and the effect of time on primers (specifically Wash Primer WP-1, MIL-C-15328A.) A mixture of phosphoric acid, zinc tetrachromate and PBVA resin, this primer is typically compounded in ethyl and butyl alcohols. It is said to be particularly valuable as a metal conditioner in connection with corrosion inhibitions via organic coatings. One disadvantage it possesses is its deterioration with time; Allen investigated this deterioration.[3]

According to Clay and Watson, a 60-40 mixture of zinc oxide and zinc potassium chromate can be substituted for zinc tetroxychromate in primers based on poly (vinyl butyral) alone or in conjunction with phenol formaldehyde. They observed that the stability of the mixture is good, and that corrosion resistance is improved.[4]

Priming paints for light alloys are described by Riggs and Skerrey, in a paper that carries on work done previously. Earlier conclusions are fully confirmed. At the end of a ten-year period, in a rural and marine atmosphere, some of the paint systems on the light metals based on $ZnCrO_4$ or zinc tetroxychromate primers require no more than cleaning or touching up. To a limited extent this is also true for the paint systems based on Fe_2O_3 primers. Coatings based on red lead primer have not proved so useful, and—apart from one system at the rural site—complete replacement would be required to restore the respective finishes. $ZnCrO_4$ and zinc tetroxychromate primer systems are preferred for composite structures of steel and light alloys at all sites, whereas Fe_2O_3 would give reasonably satisfactory results for those at the milder rural site.[5]

Chemical Plants

A number of articles published during the year discuss problems of corrosion in industrial installations and specific applications of protective coatings. Lieberman and Fuller review the mechanism of corrosion and the use of coatings to reduce or prevent it; they discuss choice of pigment in detail—red and other leads, zinc chromate, iron oxide, zinc oxide, aluminum powder, etc. They also describe cathodic protection.[6]

Larrabee and Mathay describe methods of controlling corrosion in coal and chemical plants.[7] Clark writes on protective coatings as viewed by the corrosion engineer.[8] A review article by Jelinek also deals with this subject in a general way.[9]

The protection of structural steelwork in chemical plants is the subject of a paper by Waghorn.[10] Tator, reporting on sacrificial metals as a base for organic coatings, observes that it is cheaper in the long run to use a combination of galvanic and organic coatings than either one alone.[11] The protection of pipe lines, pumps and vessels with "Neoprene" is the subject of several articles.[12-15]

Coating programs within industrial plants are described by a number of authors. The procedures employed at the Whiting, Indiana, plant of Standard Oil Co. of Indiana are detailed by Hafsten, Walston and Homan, in an article which reviews generally the causes of corrosion and of coating failures, and tells how to prepare coatings, select paints, figure costs, and maintain records.[16] The standardization program in force at the Painesville, O., and Pasadena, Tex., plants of Diamond Alkali is described by Mellrath; the firm's testing system is detailed.[17] An article in *Chemical Engineering* shows that the anti-atmospheric protection procedures currently in use at Dow Chemical have resulted in a saving of 40% in maintenance

painting costs in the last eight years. The program followed there consists of (1) painting schedules that remove guesswork on when, where, how and what-with to paint; (2) systematic selection of economical protective coatings; (3), more efficient use of materials of construction. Paints and coatings are evaluated via panels set up in representative areas, and are tested for color retention, chalking, resistance to wear, and durability.[18] In a more general way, Gleekman discusses some of the corrosion problems of chemical plants.[19] Cushing describes extended tests which show what special coatings will resist spillage; he reviews paint techniques, and lists 13 recommended systems.[20]

Epoxy resins for corrosion resistance are considered by Dunn. The properties of these resins that make them particularly suitable for corrosion resistance are their outstanding stability as a group and excellent resistance to atmospheric and chemical attack. Dunn discusses their use as coatings on pipes.[21] Lead-based paints are described by Read. These include white lead, lead tetrachromate, basic lead sulfate, and metallic lead. The use of red lead and calcium plumbate are discussed in detail by Read. The former is used principally as a paint primer for iron and steel, the latter has achieved importance as a weapon against corrosion.[22]

Choudhury and Chome write on the corrosion of steel.[23] The first part of their series discusses the protective action of lead and zinc oxides; visual examination and studies of electrode potential and weight loss were applied to the investigation of the passivating action of pigments suspended in water. The second of the series describes the inhibitive behavior of chromates, molybdate and tungstates of zinc and lead. Zinc molybdate (retaining its protective power in paints) is more effective than zinc chromate, although it loses its protective property in the presence of oil; zinc chromate is more effective than zinc tungstate. Lead compounds, almost insoluble in water, do not exhibit protective action.

An article by Duligal covers "Bitugel", a new anti-corrosive bitumen composition. The material has high sag resistance, remarkable adhesion, unusual weather resistance, salt-water resistance, and high resistance to flow under heat. It is intended for heavy-duty protection in heavily polluted atmospheres in chemical plants, where corrosion is experienced due to acidic atmosphere. There may be applications in the marine field: docks, barges, oil pipe lines, marker buoys, etc.[24]

Johnson reviews corrosion prevention in bottling plants. Here water and high humidity are essential factors in causing corrosion, and Johnson discusses various paints —oil, alkyds, styrenated oil and alkyd, epoxy-ester, epoxy, bituminous, rubber and Neoprene—and primers (particularly red lead) as they apply under these conditions. The use of paints to prevent mold is also mentioned.[25]

The characteristics of plastisols and their application as coatings for particular purposes in the pulp and paper industry are reported by Scott and Hosford. These compounds exhibit high resistance to mechanical abuse, an important factor in such applications as coatings on plating racks, bubble trays and duct systems, tank linings and linings for centrifugal cleaners.[26]

Nowacki reviews advances in the last decade covering protective linings for steel shipping containers.

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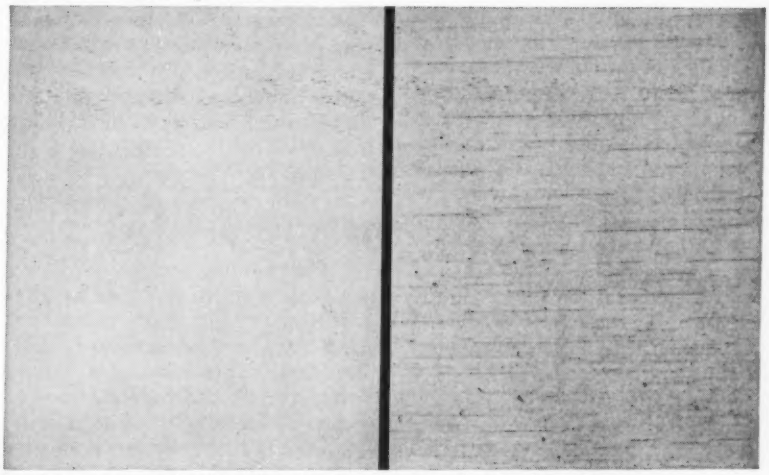

Repaints over conventional weathered system. 1 year south vertical exposure—Central U. S. A. Magnification, IX.

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His article discusses conditions affecting lining performance, application methods, testing and evaluating, and types of linings.[27]

Russian anti-corrosive paints (and particularly the work of B. V. Lyubimov on the subject) are described in an article in *Paint Manufacture*.[28]

Marine Paints

Paint Manufacture reviews the literature of anticorrosive and marine paints.[29] Primers, epoxy resin paints, vinyls, paints for structural steel, chlorinated rubber and rubber paints, bituminous coatings, etc., are covered.

A review article by Perkins discusses developments in high polymers such as vinyl, chlorinated rubber and epoxy-based compounds which, since they are impermeable to water, afford protection against the anodic pitting characteristic of ship's plates immersed in seawater.[30] On the same subject, Banfield deals with the choice of paint for cathodic protection of ships' bottoms. Near the anodes special coatings are employed, the primary function of which is to act as electrical insulators, and to prevent the cathodic current being concentrated near the anodes. Coatings are applied for 5-6 feet around the anodes, this having the effect of placing the anodes about 5-6 feet away from the hull. Coating material must be particularly resistant to alkaline attack, and must be firmly adherent to the metal, so as to resist the lifting effect of hydrogen evolution. Some of the methods of testing these coatings are described. Experience has shown that vinyl coatings, thick bituminous coatings, epoxy coatings, coal tar pitch/epoxy resin coatings, Neoprene sheet and other synthetic rubbers appear to have suitable properties.[31]

An article by Gleser describes the results of tests made over many years at locks and dams on the upper Mississippi, covering coatings for underwater metal surfaces exposed to fresh water. The longevity of various paint systems was tested. Pigmentation formulas, pigment-vehicle ratios, and composition of vehicles are discussed, as well as surface preparation of panels, coating systems employed, and life of primer and finish. A variety of problems is mentioned.[32]

Some recent Italian experience with aluminum paint in sea atmosphere is described by Luft.[33] By means of an accelerated method for rapid evaluation of various painting systems, the superiority of painting by previous anodizing and with a zinc tetrachromate-polyvinyl filler paint layer is shown.

An interesting article by Morley and others tells of trials at Plymouth, England, with paint containing pure beta-emitter thallium 204. This paint, at a radium intensity of 20 rad/hr. showed powerful inhibition against marine fouling; but at 2 rad/hr. it showed none at all. The higher intensity is impractical, according to the authors, and it seems unlikely that any other commercially attractive radiation isotope exists.[34]

According to Laurie and Parkes, trials of vinyl underwater coatings vs. mercurial types, in Sydney, Australia, indicate that the vinyl systems have a fouling free life of about twelve months on ships' bottoms. Mercurials were good for about six months. The compositions of the various coatings are given, and methods of cleaning, application, etc.[35]

MacDougall discusses the performance of epoxy resin coatings—i.e., epoxy esters, epoxy amines and epoxy polyamides—on structural steel, as well as tanks, boats, and similar marine installations. High stability of the ether-type linkage of the epoxy molecule is said eminently to fit it for use in marine environments. MacDougall's article includes formulations using esters, amine cured, polyamine cured, and coal tar compounds. Surface preparation, primers, coating systems, and application problems particular to the Gulf Coast are covered. Of the epoxy esters, the castor oil type has proved outstanding; amine-cured types are valuable on structural steel because of their ability to withstand mechanical abuse. Difficulties experienced with the formulation are noted. The article concludes with a comparison of coating costs and a description of required film thickness.[36] Protection of steel structures in salt atmospheres is the subject of a paper by Bright; use of paint is described.[37]

A paper by Fass and Fishwick describes recent paint exposure tests carried out by the Technical Committee of the Zinc Pigment Development Association (in England). Purpose of these tests was to compare the behavior of alkyd paints containing zinc oxide as a major pigment with similar zinc-free paints. The paints were applied to mild-steel panels at six seashore sites, including one in Florida. Several types of zinc oxide were used as varying fractions of total pigment. Very carefully detailed analyses indicate that differences between the paints tested were negligible after six months, and were small even after two years' exposure. During the third

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year's exposure, the differences in the chalking properties of the various paints became more pronounced, particularly in the case of the zinc-free paints. The tests demonstrated that alkyd paints of the kind tested, and containing zinc oxide, can be used satisfactorily under marine conditions with a life of up to three years. They compare favorably with similar paints made without zinc oxide, and are much cheaper.[38]

Control of corrosion of offshore platforms and cost considerations of a tender-type installation are the subject of an article by Robinson.[39] He discusses the mechanism of corrosion on such platforms, and how some of the problems can be met by proper design and use of right materials, as well as by application of protective coatings. Among maximum-resistance coatings, vinyl materials (modifier consisting primarily of vinyl acetate and vinyl chloride) offer most promise, although they have the disadvantage of poor adhesion to steel, low film build per coat, and comparatively poor resistance to abrasion. To overcome these difficulties, vinyls are generally applied in "systems". Robinson describes a five-coat system. Inspection procedures, keeping of maintenance records are discussed.

The laboratory work being carried out at the Central Dockyard Laboratory, Portsmouth, England, is described by Kingcome.[40] The selection of a site for trial is discussed, conditions at this site, kind of raft employed, procedures of raft trials for underwater paints, choice and preparation of panels, painting procedures, etc., are reviewed. An article in *Paint Manufacture* reports the research facilities and program at the Brixham Marine Research Station of the paints division of Imperial Chemical Industries, Ltd.[41]

Testing

Ploederl discusses the results of tests on several kinds of resins, which show that most coatings blister under cationic protection. The investigations covered two-and-one-half years. Of the materials tested, vinyl lost adhesion completely; coal tars blistered but did not peel off; phenolic or epoxy-modified furans and chlorinated rubber coatings blistered rapidly. Neoprene coatings applied over chlorinated rubber primers blistered, but blisters were small and elastic, and adhesion elsewhere was good. Amine-cured epoxies formed small blisters quickly; phenolic epoxy-amine-cured coatings resisted water transmission better but had reduced adhesion, and epoxy-polyamide coatings formed blisters smaller than those of phenolic epoxy types. No data is cited on polyurethane, chlorosulfonated polyethylene or other recent formulations.[42]

Tests carried out in Sweden over a period of fifteen years indicate that primers with zinc chromate, red iron oxide, and some zinc white in a binder of linseed modified alkyds or pure phenolics in Chinawood oil are satisfactory for long-range protection of air-exposed steel panels. Dependent on climate and atmosphere, one or two finishing coats are required for protection. For an extremely corrosive atmosphere, two primer coats and two finishing coats are recommended.[43]

Deboute describes an electrochemical method for determining the protective power of an anticorrosive paint. The electrical conductivity in the chain Pt-electrolyte-painted test plate shows a sudden increase when the protective coating is deteriorated. The time required for this increase is a measure of the protective power of the coating under the experimental conditions.[44]

Ladeburg and Ammer discuss conductivity measurements of zinc dust paints.[45] The corrosion prevention of these paints has been attributed to their cathodic protection and high conductivity, and the authors undertook an investigation to prove or disprove this thesis. They found that conductivity and corrosion protection increased with increase in zinc concentration and decrease in particle size, owing to the thinner binder layer separating the zinc. Conductivity and corrosion protection increased after each test cycle.

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With addition of zinc oxide (10-50%) to the paint containing 5% binder, the conductivity increases, while the corrosion prevention decreases markedly. Conductivity was generally relatively poor. Cathodic protection by zinc is evident only in limited local areas of bare iron. Corrosion protection seems to be largely due to the zinc itself, and to the closing of pores and scratches in the coating by zinc corrosion products.

Critical comment on testing the humidity of protective finishes is made by Melrose and Shave.[46] They point out that, in drawing up humidity test methods and specifications for corrosion testing, the temperature, whether constant or cyclic, should be stated within close limits, and relative humidity tolerance should be reduced to within 2% as a maximum. Some uncertainty remains regarding the optimum specimen size to be tested.

Blet describes a technique for detection and rapid localization of the corrosion of a protective coating on a metallic base,- a conductivity method which indicates the failure of non-conductive films on a conductive base.[47]

Patents

A non-flammable rust preventive composition suitable for application to ferrous metal surfaces is the subject of United States patent 2,828,213.[48] A patent issued to W. J. Francis covers a method of painting steel structures that are to be exposed under water for long periods of time; various formulations are cited.[49] Bradshaw has patented non-drying, corrosion-inhibiting coatings; these consist of lithium grease 40-60, petrolatum 30-50, and aluminum powder (100-300 mesh), 8-10%, applied in a 0.01-0.02 inch layer.[50] A process for providing a corrosion-resisting coating for steel in which at least three successive coatings are applied is patented by Salo and Clarke.[51]

British patent 795,880 covers antifouling paints.[52]

An Indian patent deals with corrosion-resistant stoving lacquer.[53] Austrian patent 198,398 covers a paste for use in rust-protecting paints which contains highly dispersed zinc pigment having flake structure.[54]

APPLICATION METHODS

Weed writes of reducing spray paint costs, citing a detailed plan for checking on the efficiency of an organic finishing shop: choice of medium (compressed air is recommended), of spray guns and other equipment, material supply (including paint pumps), proper plant arrangement, and some problems of processing—viscosity, control, agitation.[1]

Two articles by Dawe and Kinn, continuing a series published previously, describe bake ovens for paint finishing systems (problems of location, operation, auxiliary equipment)[2]; and air make-up equipment, paint storage and distribution, and fire protection.[3]

PAINT AND VARNISH PRODUCTION carries a discussion of progress in finishing methods, in three parts. The first part—by Mitchell—deals with automobiles (specifically the procedures followed at General Motors); electrostatic, dip coating, airless, and hot spray are discussed; General Motors experience with these techniques is recounted.[4] The second article deals with furniture painting; Powell notes that, at R-Way Furniture Company, a combination of cold and hot spray techniques resulted in labor-saving, better rubbing, and general quality improvement.[5] The final paper is devoted to painting practices at Martin Aircraft Company; Graham discusses problems of speed and their effect on the finisher, adhesion, and the effect of diester lubricants. The advantages of airless spray are reviewed.[6]

The why and how of metal preparation for finishing are reviewed by Dawe and Kinn; they describe techniques of metal cleaning.[7] Hurst also discusses preparation of steel surfaces for painting: cleaning rusted and contaminated areas, removing prior coats, techniques for achieving most lasting and economical results.[8] Finishing of hot-galvanized steel by painting is the subject of a paper by van Eijnsbergen. He notes that, before applying paint to hot-galvanized steel, it is advisable to clean the surface by mild sandblasting or via a wash-primer; he also recommends the use of paints containing metallic zinc.[9]

Spencer discusses organic finishing of aluminum and its alloys. Surface preparation, primers, and final finishes are reviewed. Among the products considered are synthetic resin formulations (styrenes, polyamides, acrylates, ethylcellulose, vinyls, alkyds, melamines, silicones, phenolics, ureas, urea-formaldehyde, furans), bituminous paints, and luminous paints. Methods of application are described ods of application are described and evaluated.[10]

Patents

An exhaustive patent review of phosphating treatments was carried in *Metal Finishing*.[11]

A spraying method for applying catalyzed coating compositions was patented by Upperman (to Glidden Co.); the catalyst is admixed with a stream of compressed air and sprayed simultaneously with the coating composition.[12]

Gemmer patented a fluidized-bed coating process. The articles to be coated are heated, and then immersed in a fluidized bed of a fusible material. For example, powdered polyethylene (of grain size 0.002-0.012 inch) was fluidized by passing inert gas through it.[13]

AEROSOLS

The application of aerosol packaging to paints and lacquers is still sufficiently recent so that no extensive literature covering the field is available. However, a number of informative articles appeared during 1958; these are summarized below. It should be noted, in passing, that the February, 1959, issue of PAINT AND VARNISH PRODUCTION is devoted almost entirely to the subject of aerosol paints. This review, however, falls outside of the date limit of the present literature survey.

Hecht deals with aerosol protective coatings. He points out that air-drying types of coatings (so far the most important group of aerosol protective coatings) may be loosely classified as (1) the varnish and (2), the lacquer. The first dries mainly by oxidation or polymerization, or both; the second dries by solvent exaporation only. Among varnish types of coatings,

the so-called synthetic or alkyd types are most important for aerosol work; among the lacquer type, nitrocellulose is the most important. Hecht discusses coatings in general and aerosol coating problems in basic terms: the problem of solvent choice, of propellent, etc. He emphasizes the importance of individual formulation, taking into consideration all the ingredients of the finished formula, and of full-scale testing before release of a product (he considers six months a minimum period.) Raw materials, can and valve must be carefully evaluated. The author points out that the presence of moisture in the loaded can—once a considerable source of difficulty—has now been, in large part, obviated as a problem. Hecht discusses some of the problems specific to the preparation of alkyd and nitrocellulose aerosol protective coatings. It is his conclusion that formulations incorporating both nitrocellulose and alkyd are probably the best for aerosols: they are fast-drying, have great toughness, greater durability, better color retention.[1]

An article by Gaines points out that the current trend in aerosol paint research is primarily concerned with modifications of the propellent system and with developments toward pressure packaging water-based coatings. As regards propellents, the emphasis has been on the LP gases—propane, butane, and iso-butane. The problems and advantages in the use of these gases are discussed in detailed. Non-liquefiable gases, such as carbon dioxide, nitrous oxide and nitrogen, are also under investigation. The incorporation of these gases into formulations is described. Water-based formulas are considered, including such factors as gas entrainment in the paint solution, can and valve corrosion, gas escape. Formulations for water-soluble decorative spray, white aerosol lacquer, clear lacquer, aerosol metallic paint and orchid aerosol enamel are given.[2]

The same issue describes the new custom loading facilities at Aeropak, which can turn out 15,000,000 aerosol cans yearly.[3]

The formulation of aerosol alkyd enamels is the subject of a paper by Bower. This describes work carried out at the Freon Products Laboratory of DuPont, in Wilmington, with the purpose of evaluating effects of the major variables on alkyd enamel formulations. Properties desirable in an aerosol paint are considered: spray pattern, hiding, discharge rate. Variables which affect these factors are pigment-to-resin ratio, viscosity, solvent exaporation rate, solvent power, and valve construction. Viscosity, solvent selection, evaporation rate, and valve operation are discussed in detail.[4]

The new Plasti-Kote line of car-matching paints is described in *Aerosol Age*. This is a complete line of aerosol lacquer enamels in colors matching the 1957 and 1958 Ford, Chevrolet, and Plymouth automobiles.[5]

Two articles deal with the use of vinyl chloride as propellent. The first of these (by Iosaki) reports that vinyl chloride is being investigated currently in Japan; it has been discovered that the compound will repress the combustibility of oil gas propellents when mixed with them. A comparison of the properties of vinyl chloride propellant with butane and other propellents, according to Iosaki, shows that the former's explosive effect is minimal; that it has considerably less toxicity than methyl chloride; its ignition point is 612°F.; it is free of offensive odor.[6] Kuebler discusses vinyl chloride as an aerosol propellent. He describes the dispute over the properties of the gas, citing the work of Iosaki noted above to prove that certain objections raised against it do not appear valid. He also records his own observation that vinyl chloride produces an "ideal" pressure for all true aerosol products without the mixture of any other gases; that it is an excellent solvent for lacquers, with better properties in this regard than those possessed by most other propellents; that it is odorless; and that the ignition point is around 545-565°. Kuebler also points out that the ideal propellent would appear to be vinyl chloride *and* fluorinated hydrocarbons *and* propane-butane mixture: all three types have their advantages, and can be used separately or in mixture, depending on product and application.[7]

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PERFORMANCE TESTING AND CHEMICAL ANALYSIS

COMMITTEE D-1 of the ASTM on Paints, Varnishes, Lacquer and Related Materials put in active year in developing new test methods and specifications. Some ten new methods were adopted and about twenty tentative methods were approved for standard procedure. Some of the methods approved were: total iodine value, acidity in lacquer solvents, melamine content of nitrogen resins, analysis of polyvinyl butyral resins, performance testing of clear floor sealers, and print resistance of varnishes.

Presently the subcommittees are concerned with such projects as: methods to evaluate hardness of films, the rheological properties of paints, the measurement of dry film thickness on non-magnetic and non-conducting base, rosin content of driers and vehicles, phenolic content of varnishes, test methods for polyurethane coatings, and phthalic anhydride analysis.

Committee D-1 has maintained close cooperation with the Federation of Paint and Varnish Production Clubs through a joint Federation-ASTM Committee. In the interest of cooperation and information, D-1 has representatives on some thirty other ASTM Committees. These include groups on Appearance, Corrosion, Quality Control, Plastics and Methods of Testing.

With the adoption of zoning ordinances for controlling air pollution by many municipalities, the paint industry became vitally interested in methods and instruments to analyze the effluent from their production facilities. In this connection, three methods—mass spectrometry, infrared spectroscopy, and vapor phase chromatography—were recommended for this purpose. Gas chromatography, because of its practicality and low cost was favorably received by the paint industry.

Interest was noted in the use of radioisotopes for the measurement of thickness of paint films. Tolerances obtained with this method are within 0.5 to 2.0 percent.

PERFORMANCE TESTING

General

The variables affecting the validity of accelerated coating tests are discussed by Richardson. He describes variations in materials, formulation procedures, surface preparation and materials used for surface preparation; environmental factors, and application variables.[1] Impedance measurements applied to organic coatings are the subject of a detailed paper by Shaw and Twiss. In Part I of their paper, the authors discuss degradation of organic coatings, and how this can be determined by alternating impedance measurements of the coated panels immersed in electrolytic solution. Impedance is decreased on degradation; however, this may be due to several factors. Part 2 deals with measurements applied to determine the effect of natural and accelerated weathering on clear coatings over chromium-plated steel and zinc die cast panels; they are interpreted in terms of series capacitance[2] Schuettler describes the Aminco Magne-Gage, designed for nondestructive measurement of coating thickness.[3]

An electron microscope study of accelerated and natural weathering is the subject of a paper by Twiss, Weeks and Teague. It describes an investigation of six automotive synthetic baking enamels of the alkyd (90%)-melamine formaldehyde (10%) type and six automotive force-dry type nitrocellulose lacquers. The weathering of these finishes results in such defects as chalking and checking. The electron microscope was used to study these surface changes, employing a two-stage replica technique. An inorganic pigmented finish (light green) and an organic pigmented finish (dark maroon) were studied in the form of lacquer and enamels under Florida exposure and in the XW Weather-Ometer; results are analyzed in detail.[4]

Palen describes use of a Norelco 100 KV electron microscope to control latex quality at Naugatuck Chemical Division, U. S. Rubber Co. The microscope is employed to check particle size of latex, i.e., to determine that the particle size is adjusted to the end-use of the latex.[5]

Spectrophotometry and the paint industry are the subject of an article by Lawrence. He deals with the technique of preparing samples, interpretation of results, and the practical use of curves obtained, including their introduction in paint literature and brochures.[6]

Radiation effects are described in two articles. Terai tells of damage done to various films by gamma irradiation. His paper describes tests to show how a coated film functions under radiation attack, how far it will withstand such attack, how it changes, and what relation paint compounds have with the changes. Materials tested included boiled linseed oil, nitrocellulose lacquer, and several synthetic resin materials. Coatings were put on 0.1 mm aluminum foil, then dried and subjected to Co 60 radiation. Least change was noted in alkyd resin and unsaturated polyester (so far as tests went). Vinyl chloride series varied within itself. Changes noted with other types are discussed. Pigmentation plainly influenced the results: hence three types were tested—drying oil, chlorinated rubber, and vinyl chloride. Of these, chlorinated rubber was the most affected. Materials were tested for scratch hardness, drawing, and bending.[7] Horrocks reports the effects of gamma radiation on organic coatings such as phenolics, silicone-alkyd enamels, epoxy, fluorinated vinyl, and nitrocellulose lacquers.[8]

Durack describes a type of electrified particle inspection that locates defects in non-metallic coatings. Minute cracks in glass, plastic, silicone or epoxy-resin coatings may be located using a selected powder which is blown through a hard rubber nozzle. Electrons rub off as the particles pass through the gun nozzle, charging the powder positively. As the powder approaches the test piece, electrons are attracted from the base metal, particularly where a pinhole or crack exists. Thus the powder builds up over defects. Wherever a defect is completely through-to-metal, a "blink" or apparent pulsation occurrs during inspection. The method is so sensitive it is possible to locate defects less than 4 millionths of an inch wide.[9]

The subject of heat transfer through coated metal surfaces is treated by Lee. Coatings may protect existing metal heat transfer surface against corrosion, but the objection is raised that coatings may decrease heat transfer. For this reason, experiments were made to determine whether the objection is valid. A 4 ml.-thick phenolic coating and a 15 ml.-thick vinyl coating on heat exchangers were used. It was found that application of thin coatings to such surfaces in low to medium coefficient systems not only decreases corrosion but also gives higher heat transfer rates than ultimately experienced with corroded, uncoated metal surfaces. This is true even though a somewhat lower heat-transfer coefficient exists initially for the coated surface.[10]

An article by Gardner discusses film applicators and their use for applying a wet film of specified uniform thickness to test panels. Several types of applicator are described, and some of the practical problems in using them are noted.[11] Clapboard test panel preparation is reviewed in a paper in PAINT AND VARNISH PRODUCTION. DuPont procedures are described, which involve careful panel selection and preparation; these are important in eliminating some of the variables in perform ance testing.[12]

Specific Properties Testing

Hoffmann gives the details of an apparatus for measuring adhesion of paint films to permeable materials designed so that pressure may be applied gradually to the underside (unpainted side) of the substrate until the paint film starts to lift off. It has been found useful for measurements of adhesion to fibrous plaster, set-gypsum plaster and permeable cement mortar, but it was not successful with asbestos cement, which has too low a permeability for this purpose.[13] Dintenfass discusses the nature of adhesion in paint films, including the mechanism of adhesion, forces that tend to destroy it, and components necessary to attain good adhesion.[14] In *Journal of Polymer Science*, Weatherwax, Coleman and Tarkow de-

scribe a technique for measuring the tensile stress developing in the plane of edge-clamped gelatin films during drying. It is based on the elastic deformation of the film when stressed normally to the plane of the film.[15]

An article by Hawkins and Wampner discusses brushability of paints. Quantitative evaluation of brushability is made on an R.C.I. Brushability Recorder. The authors conclude that this high-shear type of viscosimeter is an excellent control instrument and that, once a coating formulation has been established as having satisfactory brushing characteristics, the instrument is a reliable way of checking future batches. Inexperienced help can make determinations with little instruction. Chief criticism of the Recorder is that it is most useful in hands of someone who can consistently repeat his technique; "personality factors" have been observed, which, the authors say, have not so far been obviated.[16]

Two articles deal with problems of color matching. Gilbert discusses age factors in color change, i.e., the changes in color perception that accompany aging of subjects tested for their color sense. Results of the tests showed a rise in separate and total scores from the 10-19 age group to the 20's, with a subsequent steady decline. At all ages, but particularly in the 60's, wide individual differences were found in ability to match colors.[17] Standardized lighting recommendations for critical color matching and production tinting of paint products are the subject of an article by Reese. The nature of visible light and "color temperature" are discussed briefly, after which there is a detailed consideration of the practical problems involved in color production and matching and recommendations for establishing standard light source, quality of daylight, primary standard light source, secondary standard light source, etc.[18]

Gross and Loftus discuss flame spread properties of building finishing materials, in a paper which describes the radiant panel flame spread test developed at the National Bureau of Standards.[19]

An article in the *Official Digest* reports a mathematical analysis of the precision in determining hiding power. Typical standard deviations encountered in measuring the reflectance and the film thickness of paint films on hiding power charts are discussed, and their effect on the precision of hiding power measurements is computed. This mathematical analysis is made by differentiating the Kubelka-Munk equations for hiding-power as modified by Switzer.[20]

Weinmann deals with measurement of film porosity. Microscopic pores (10^{-2} to 10^{-4} cm. diameter) in a paint film develop during drying due to evolution of gases and vapors. Various electric and electro-chemical methods of measuring porosity give reliable results. In general, the porosity decreases with increase in film thickness and practically disappears in two-coat films. Phenolic resin and cyclized rubber yielded the least porous and poly (vinyl butyral) the most porous films. The method which was described and used by Weinman compares favorably with other porosity measurements. There is no direct relation between porosity and water-vapor permeability (WVT), water transmission and swelling. The latter are primarily dependent on the chemical structure and submicroscopic porosity of the film. Highly pigmented, porous films have always lower permeability

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than non-pigmented films containing little or no pigmentation.[21] Bratkowski also writes on porosity of films. He describes methods of testing porosity: the ferroxyl test, hot water tests, Dubpernell test, electrographic method, salt spray test, impregnation method, autoradiographic techniques, porosimeter, measurement by passivation time, by gas permeation, and anodic metal deposits.[22]

Permeability and absorption studies of epoxy films are reported by Dunbar and Peffer. The water, benzene and ethanol permeability and absorption properties of unfilled and epoxy films were investigated.[23]

Blevin writes on the opacity of paint. Some of the elementary properties of diffusing media are discussed, and the Kubelka-Munk theory of light diffusion is applied to the photometric problems involved in the use of hiding-power boards to measure the opacity of paints. The results of such measurements appear to have little meaning unless the boards comply with suitable specifications; a base for setting up such specifications is proposed. An Appendix considers the "effect of an overlying paint layer on the background reflectance".[24]

Dintenfass discusses selective polar adsorption and some rheological phenomena in paint systems. The effect of polar adsorption on the dispersion and wetting of pigments and resultant rheological structures is described. Thixotropy, viscosity, and yield value of paint systems are reviewed, and the effect of the dilatancy of the paint vehicle is considered. Former methods of approach to the problem are evaluated. Viscosity equations are suggested, relating sedimentation volumes and effective (hydrodynamic) volumes of pigments to the relative viscosity of suspension. Also suggested are empirical equations covering rate of thixotropic recovery and time required for mixing (under some conditions). Some aspects of diffusion in paint systems are mentioned, and the diffusion is suggested to be a time-dependent function. A selective polar adsorption mechanism is shown to play a part in adhesion and corrosion, and quite likely also in the aging and weathering of paint films.[25]

Another article on the rheological aspects of thixotropic paint systems is that of Doherty and Hurd. The authors describe the use of a co-axial cylinder viscometer for the measurement of stress-strain curves of paint systems at very low rates of shear and for the measurement of thixotropic recovery of such systems. It is shown that these quantities should be measured for the full evaluation of sagging and flow-out, although two simpler tests using a drawdown blade and comb-tester may suffice in many instances. The application of these methods to paint systems containing bentones, aluminum alcoholates, polyamides, hydrogenated castor oil and various pigments and extenders is described in detail.[26]

Rinse writes on the same subject. He describes use of the Brookfield viscosimeter at 6, 12, 30, and 60 rpm, which makes it possible to examine thirty paint samples per hour, in order to determine the difference between viscosities at lowest and highest speeds going from low to high speed, and the same differences but going back from high to low speed. For most practical work the determinations can be done at room temperatures (20°C ± 2°C). Storage stability can be tested. The test allows a comparison of thixotropic additives, and the results indicate that most of them primarily create false body. Chemical combinations of alkyds and thixotropic agents cause desirable thixotropic behavior with longer recovery times, enabling good leveling. Latex-paint thixotropy has been determined and results correspond also with brushability tests.[27]

A new tool for the evaluation of sagging of paint is described by Reynolds and Larson. Measurement of sagging should be based on assessment of the thickness of a paint film at which flow is excessive; it is therefore necessary to cast a uniform film and sag line in one simple operation: for this purpose a Sag Index Blade has been developed, similar to a conventional film applicator, but having notches so that seven uniform parallel stripes of paint can be applied simultaneously. A wide variety of proprietary or "trade sales" enamels were examined for sagging. A table of results obtained is given. The Blade may also be used for measuring hiding power. Sagging is rated in terms of the film thickness at which flow exceeds 25% of the original thickness of the film. Good correlation was found between Sag Index and ratings obtained from actual brush-outs.[28]

Viscometric behavior of polymethyl acrylate in some solvents is the subject of a paper by Srinivasan and Santappa. Viscosity measurements of polymethyl acrylate of different molecular weights were made in four solvents at 30°, 35° and 40°C; the solvent powers of the latter decrease in the order chloroform > ethyl acetate > methyl ethyl ketone > toluene. The effects of temperature and low concentrations of polymer on intrinsic viscosity were determined.[29] A report on a collaborative viscosity study of the ASTM Committee D-1, Subcommittee IX, Group 18, is published in the *Official Digest*. The problem: to determine the effect of variations in the internal diameter of the Gardner-Holdt type viscosity tubes on the time of bubble rise—all other factors being equal.[30] Clark reports on a rotational viscometer for thinning paint samples. The instrument described has these variations: the Rotothinner for viscometry measurement and manual thinning; the Auto thinner for automatic thinning; and the Microthinner, similar in design to the Rotothinner, for very small amounts of sample material. All function on the principle of using the torque produced when paint is mechanically stirred in a standard container either to give measurements can be made to ± 0.05 poise and thinning operations can be carried out within the usual specification limits for viscosity. The instrument can be used with most paints and varnishes and is quicker and cleaner than other methods.[31]

Eveson deals with stable surfaces of spherical particles, specifically the influence of the size ratio of the dispersed phase upon relative viscosity. A rotational viscometer was used; results indicate that there is only a random variation

of viscosity with size ratio. The possible effect that size ratio might have upon viscosity is discussed; it is concluded that the form of the size-distribution curve should exert a more pronounced influence than the ratio of diameters of spheres occuring within the suspension.[32]

CHEMICAL ANALYSIS

Analysis of Additives

Lucchesi and Hirn write about the determination of the metal content of paint driers. Their article describes a simple titrimetric determination of the metal content of calcium, cobalt, lead, manganese and zinc driers; the results are in close agreement with those obtained by gravimetry and flame photometry. The method is based on the reaction of metal ions with the chelating agent, ethylenedinitroltetraacetic acid (EDTA). The method eliminates decomposition typical of other methods. The drier is dissolved in an alcohol-benzene solution, a known excess of EDTA is added, and the excess is back-titrated with standard zinc chloride to the Eriochrome Black T end point. Only 0.2 gram sample is needed, and a single determination can be made in ten minutes. The coefficient of variation of the method is estimated at 0.8%. Value of the technique lies in the fact that the metal content of the driers is the most critical factor in determining their cost and performance, so that control of metal within rather narrow limits is an advantage in the manufacture and use of driers.[1]

Writing on the same subject, Secrest discusses flame photometry determination of the metal content of calcium, cobalt, lead and manganese paint driers. A Beckman DU spectrophotometer equipped with a No. 9200 flame attachment, a No. 4300 photomultiplier, and a No. 14500 battery power regulator was used. Variables investigated in the development of the method were solvent dilution, slit width, and sample weight. The drier is dissolved directly in a benzene-acetone-alcohol solvent. Metal concentration is obtained by comparing the emission of the solution with the emission of a standard solution. Duplicate determinations take about one-half hour. Standard deviation of the method varies from 0.60% (of the total metal found) for lead, to 0.85% for calcium. Agreement with chemical methods is within about 1%.[2]

The estimation of small quantities of organotin compounds is the subject of an article by Price. Quantitative analysis of an individual compound offers no special difficulty: tin content is always found by converting the tin into the inorganic form and then determining it by any one of several conventional methods. Estimation in PVC materials is described in detail. Determination of dialkyl and trialkyl tin compounds is considered. Polarographic methods of estimating organotin compounds are reviewed.[3]

Analysis of Oils

Poxon describes chromatographic examination of oils with dyed filter papers; characteristic chromatograms for essential and fixed oils are obtained, and aging properties of any sample of fixed oil can be assessed easily. Experiments car-

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ried out with other substances (synthetic detergents, for example) suggest that by suitable choice of dyes and developing fluid, the methods can be used as an aid to identification of other high-molecular weight organic compounds.[4]

An article in *Oléagineux* deals with the infrared spectrophotometry of linseed oil. Both raw oil and treated oil (stand oil) were studied, as well as the relative autoxidation of the *cis* and *trans* forms of the oil. The materials and procedures used are described and the results obtained are tabulated, plotted, and discussed. The 10.35m band was found to correspond to the formation in the treated oil of the highly active *trans* form, which autoxidizes more slowly than the *cis* form.[5]

Minutilli discusses the spectrophotometric examination of linseed oil during standolization in an inert-gas atmosphere. He finds that stand oils prepared in an inert gas atmosphere (carbon dioxide or nitrogen) are of better quality than those prepared by heating air. Spectrophotometric examination of the behavior of the oil during heating shows that the amount of conjugated diene bonds increases with the time of heating; the ratio of two consecutive extinction coefficients tends to a constant value.[6]

Bauer and Einset write of the determination of the unsaponifiable matter of tall oil distillates.[7]

The preparation and infrared spectra of morpholides of ricinoleic acid and some of its derivatives are discussed by Dupuy, O'Connor and Goldblatt.[8]

Analysis of Paints

Hanson has written a comprehensive review covering separation of pigment from medium, separation by dispersion on salt; analysis of solvent mixtures, pigment mixtures, media; his exhaustive review contains 57 references.[9] Literature surveys covering analysis and testing are found in issues of *Paint Manufacture*.[10]

The application of the Kjeldahl technique to the analysis of paint and resin materials is discussed by Weinle. He covers reagents, apparatus and procedures, and describes results obtained with several types of resin and film, using Dumas determinations for comparison. The modified Kjeldahl technique is said to be useful for rapid analysis of a number of urea-formaldehyde and melamine-formaldehyde resins.[11]

Hobden discusses the techniques of gas-liquid chromatography and their application to the field of solvent analysis—an "obvious application".[12]

An article in the *Journal of the Oil and Colour Chemists' Association* reports the use of the electron microscope in the surface-coatings industry. This technique makes possible an improved resolution. Special procedures used for the examination of paints, including a replica method, are described and illustrated by work on the change in structure of zinc sulfate occurring in calcination and on the structure of lithopone. The method for examining surfaces is noted, and the effect of accelerated weathering of a number of paint surfaces is described, showing different types of breakdown. Use of a technique for the preparation of thin cross-sections of dried paint films for examination by transmitted beans is also reported.[13]

A detailed article on analytical spectroscopy in the protective coatings industry appeared in the *Official Digest*.[14]

Analysis of Pigments

Toporets writes about the absorption and scattering of light in pigments. The absorption and scattering of cadmium red and cobalt blue pigments was determined from their reflection spectra and found to be in good agreement with the microspectrophotometric measurements of the individual particles. The proportionality between the difference in functions and the concentration of the absorbing pigment in a mixture with TiO^2, MgO, ZnO, $CaSO_4$ or powdered glass was established by the method of dilution. The numerical values of the reflection coefficients depend on the absorption and scattering properties of the reflecting layer.[15] Dunn and Cestaro report in some detail on the spectrographic analysis of lead pigments, lead oxides and metallic lead.[16]

Analysis of Vehicles

Dintenfass published the second part of a study of paint vehicles. His article covers a method for the estimation of hydrogen average molecular weight (M_h) of resins. Main feature of the method is its applicability to concentrated (20-60%) resin solutions. Some aspects of molecular weight distribution are discussed and some current ideas on this subject are reviewed. A general equation of viscosity is deduced, incorporating the parameters previously discussed (in Part I): solvent effective polarity, resin concentration, and the temperature-viscosity relationship (the latter being considered here more fully). Methods of predicting viscosity of resin solutions, including binary and ternary resin systems, are discussed. A deduction of the hydrodynamic diameter of resin molecules and aggregates is attempted.[17]

Methods for the analysis of textile resins are reviewed and summarized, and in some instances cited in detail, by Morath and Woods. Methods include those for the amino portion of the resin and the various forms of formaldehyde and/or methanol. The chromotropic acid method for total formaldehyde should be of particular interest because of its speed and simplicity.[18]

Esposito and Swann describe an improved method for determining ketones in lacquer solvents, directly applicable to lacquer vehicles. The ketone content of solvents and thinners is important because, with the esters, this is the active solvent, and all lacquer specifications require analysis for these two ingredients. Methods for determining ketones have not generally been satisfactory, and the causes for this fact were investigated by the authors. In addition, a technique of modified hydroxylamine hydrochloride method was developed which allows precise determination. A procedure for determining ketones directly on lacquer vehicles without prior removal of solvents is described.[19]

The rapid determination of polyacrylonitrile in coatings by infrared absorption spectrometry is discussed by Adams and Swann. A Model 21 Perkin-Elmer double-

beam infrared spectrometer with rock salt optics was used, with settings corresponding to a resolution of 973, response of 1, gain of 5, speed of 1 micron per minute, and a suppression of 0. Samples were held in a 0.2 sodium chloride fixed cell. Precision and accuracy exceed those usually obtained from the infrared analysis of coating resins. Determination of good accuracy can be made directly on the resin solutions or on a quantitative dilution if there is need to lower the viscosity, using a fixed sodium chloride absorption cell and compensation in the reference beam. A variation of the base line technique is used in the calculation of absorbances, the base line being so chosen that the slight absorbance due to solvents is rendered constant.[20]

The same authors describe a microscopical method for identifying eleven acids in alkyd resins and polyesters.[21]

Elias and Patat, writing of branching polyvinylacetate, investigated the hydrodynamic and thermodynamic properties of 15 fractions from six different PVA's determined at 25°C in 2-butanone by means of osmotic pressure, light scattering, sedimentation, diffusion and viscosity.[22]

Adams and Swann report on the detection of phthalic acid isomers and benzoic acid in alkyd resins by infrared absorption spectrometry.[23]

Determination of chlorinated rubber and polyvinyl chloride in the presence of each other is the subject of a paper by Norwitz. A method is proposed whereby the chlorinated rubber is separated from the PVC by use of chloroform, which dissolves the chlorinated rubber but not the PVC. The chlorine content of the rubber and PVC is then determined by a procedure that involves a closed fusion system: the sample is mixed with sodium carbonate in a large platinum crucible, a small crucible is inserted upside down into the large crucible, and the space between the two crucibles is packed with magnesium oxide. On heating, the sodium carbonate melts but the magnesium oxide does not. The sodium carbonate and magnesium are dissolved in nitric acid and the chlorine determined as silver chloride.[24]

Swann and Adams discuss determination of salicylanilide in varnishes by ultraviolet spectrophotometry. The salicylanilide is determined in tung oil varnishes of various lengths. The procedure is said to be simple with an error of less than 1%. Absorption of an alkaline extraction solution at 336 mμ was measured and found to be free of interference from other varnish constituents.[25]

An article in *Analytical Chemistry* reviews detection of urea, melamine isocyanate, and urethane resins, specifically a rapid group test for nitrogen, silicon, phosphorus, and titanium in coating materials. The methods described are useful for qualitative identification of synthetic resins in complex systems. Specific and simultaneous tests for urea-formaldehyde and melamine-formaldehyde coating resins and a test for isocyanate and urethane are presented. A rapid acid-digestion is described for detection of nitrogen, phosphorus, silicon and titanium.[26]

The spectral absorption of asphaltic materials is discussed by Schweyer.[27]

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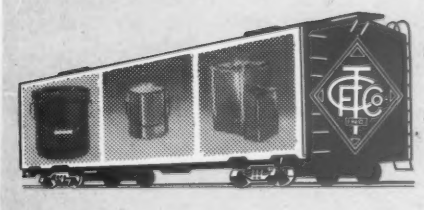

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(14)
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(13)
100 E. 42nd St.
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Continental Oil Co.
(10)
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Coors Porcelain Co.
(11)
Golden, Colo.
Corn Products Refining Co.
(5)
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New York 4, N. Y.
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D

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(9)
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New York 5, N. Y.
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Dayton 1, Ohio
International Talc Co., Inc.
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90 West St.
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J

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(6)
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K

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***J. M. Lehmann Co., Inc.**
(11)
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(5)
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(11)
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(11)
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Denver 23, Colo.

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(7)
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(1, 7)
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N

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(7)
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(7)
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Nitrogen Div.
(5)
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(14)
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O

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(2, 5, 9)
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(9)
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P

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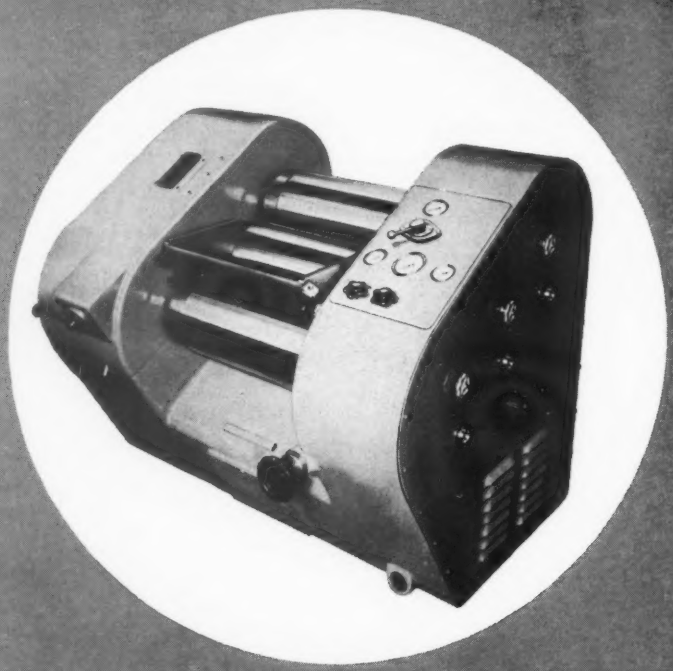

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Naftone, Inc.

Lecithin
American Lecithin Co., Inc.
The Buckeye Cotton Oil Co.
Naftone, Inc.
A. E. Staley Mfg. Co.
Ross & Rowe, Inc.

Marproofing Agents
Raybo Chemical Co.

Masking Agents
Aromatic Products Co.
Polak & Schwarz, Inc.
Sindar Corp.
van Ameringen-Haebler, Inc.

Masonry Water Repellents
Dow Corning Corp.
General Electric Co.

Metal Cleaners
Pennsalt Mfg. Co., Industrial Div.

Mildewcides
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Antara Chemicals Div., General Aniline & Film Corp.
Buckman Laboratories, Inc.
Dow Chemical Co.
E. I. du Pont de Nemours & Co., Inc.
Gallowhur Chemical Corp.

Odorants
Aromatic Products Co.
Dodge & Olcott, Inc.
Fritzsche Bros.
Polak & Schwarz
Rhodia, Inc.
Sindar Corp.
van Ameringen-Haebler, Inc.

Paint Remover Ingredients
Dow Chemical Co.
Pennsalt Mfg. Co., Industrial Div.

Phosphate Coatings
Pennsalt Mfg. Co., Industrial Div.

Preservatives
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Buckman Laboratories, Inc.
California Ink Co., Inc.
Dow Chemical Co.
E. I. du Pont de Nemours & Co.
Nuodex Products Co.
Shepherd Chemical Co.
Union Carbide Chemical Co.

Protective Colloids
Borden Co.
Kelco Co.
Shawinigan Resins Corp.

Puffing Agents
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Raybo Chemical Co.

Reflective Spheres
Flex-O-Lite Mfg. Co.
Potters Brothers, Inc.

Sanitizing Agent
Denton Edwards, Ltd.
Dianol Div., Mills-Pearsor Corp.
Nuodex Products Co.

Shingle Stain Oil
Neville Chemical Co.

Stabilizers
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Alkydol Laboratories, Inc.
Borden Co.
Deutsche Hydrierwerke GMBH
Dow Chemical Co.
Fallek Products Co.
General Aniline & Film Corp.
Minerals & Chemicals Corp. of America
Nopco Chemical Co.
Pennsalt Mfg. Co., Industrial Div.
Raybo Chemical Co.

Stearates
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
W. H. Fales Co.
Mallinckrodt Chemical Works
Metasap Chemical Co.
Nuodex Products Co.
M. W. Parsons-Plymouth, Inc.
Whittaker, Clark & Daniels, Inc.
Witco Chemical Corp.

Surface Active Agents
Air Reduction Chemical Co.
American Alcolac Corp.
American Cyanamid Co., Organic Chemical Div.
Antara Chemicals Div., General Aniline & Film Corp.
Armour Chemical Div., Armour & Co.
Atlantic Refining Co.
Atlas Powder Co.
Baker Castor Oil Co.
E. F. Drew & Co., Inc.
E. I. du Pont de Nemours & Co.
Foremost Food and Chemical Co.
Geigy Corp., Industrial Chemical Div.
General Mills, Chemical Div.
Glyco Products
Monsanto Chemical Co.
National Aniline Div., Allied Chemical Corp.
Nopco Chemical Co.
Pennsalt Mfg. Co., Industrial Div.
Raybo Chemical Co.
Synthetic Chemicals, Inc.
Troy Chemical Co.
Union Carbide Chemical Co.
Witco Chemical Co.
Wyandotte Chemical Corp.

Surface Preparation Chemicals
Amchem Products, Inc.

Suspension Agents
Godfrey L. Cabot, Inc.
Fallek Products Co.
B. F. Goodrich Chemical Co.
Kelco Co.
Minerals & Chemicals Corp. of America
Raybo Chemical Co.

Thickeners & Gelling Agents
Anderson Chemical Co.
J. S. Ayers & Co.
Baker Castor Oil Co.
Borden Co.
Godfrey L. Cabot, Inc.
W. H. Fales Co.
Dow Chemical Co.
General Aniline & Film Corp.
B. F. Goodrich Chemical Co.
Kelco Co.
Minerals & Chemicals Corp. of America
Nopco Chemical Co.
Price Varnish Co.
Raybo Chemical Co.
Shawinigan Resins Corp.
Shepherd Chemical Co.
Tamms Industries, Inc.
Union Carbide Chemical Co
Viscatone Chemical Co.
Witco Chemical Corp.
Wyandotte Chemicals Corp.

Ultraviolet Absorbers
American Cyanamid Co.
Organic Chemical Div.
Antara Chemicals Div., General Aniline & Film Corp.

Vinyl Stabilizers
Argus Chemical Corp.
Ferro Chemical Corp.
Harshaw Chemical Co.

Waxes
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Bareco Oil Co.
Glyco Products Co.
Semet-Solvay, Petrochemical Div.
Shell Oil Co.
Union Carbide Plastics Co.
Warwick Wax Co.
Witco Chemical Co.

DRIERS
2

Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
California Ink Co., Inc.
Ferro Chemical Corp.
Harshaw Chemical Co.
McCloskey Varnish Co.
McGean Chemical Co.
Mooney Chemicals, Inc.
Naftone, Inc.
Nuodex Products Co.
Oronite Chemical Co.
Shepherd Chemical Co.
Troy Chemical Co.
Fred'k A. Stresen-Reuter
Witco Chemical Co.

Dry Accelerators
R. T. Vanderbilt Co.

DRYING OILS
3

Castor Oils
Baker Castor Oil Co.
Brazilian Industrial Oils, Inc.
Degen Oil and Chemical Co.
T. F. McAdam
Pacific Vegetable Oil Corp.
Sherwin-Williams Co.
Spencer Kellogg & Sons, Inc.
Woburn Chemical Corp.

Coconuts
Cargill, Inc.
E. F. Drew & Co.
Emery Industries, Inc.
Glidden Co.
Kraft Chemical Co.
Pacific Vegetable Oil Corp.
Spencer Kellogg & Sons, Inc.

Cotton Seed
Armour Chemical Div., Armour & Co.
E. F. Drew & Co.
Emery Industries, Inc.
Spencer-Kellogg & Sons, Inc.

Dicyclopentadiene Copolymers
Spencer Kellogg & Sons, Inc.

Fish Oil
Archer-Daniels-Midland Co.
Cargill, Inc.
Crownoil Chemical Co.
T. F. McAdam

Linseed Oils
Archer-Daniels-Midland Co.
Cargill, Inc.
Degen Oil and Chemical Co.
T. F. McAdam
Spencer Kellogg & Sons, Inc.
Minnesota Linseed Oil Co.
Pacific Vegetable Oil Corp.
Sherwin-Williams Co.
G. S. Ziegler & Co.

Oiticica
Brazil Oiticica, Inc.
Brazilian Industrial Oils, Inc.
T. F. McAdam
Pacific Vegetable Oil Corp.

Petroleum Drying Oils
Amoco Chemicals Corp.
Enjay Co.
Sun Oil Co.

Safflower
Degen Oil and Chemical Co.
Pacific Vegetable Oil Corp.

Soybean Oils
Archer-Daniels-Midland Co.
Cargill, Inc.
Crownoil Chemical Co.
Degen Oil and Chemical Co.
E. F. Drew
Emery Industries, Inc.
Glidden Co.
General Mills
T. F. McAdam
Spencer Kellogg & Sons, Inc.
Pacific Vegetable Oil Corp.
A. E. Staley Mfg. Co.
G. S. Ziegler & Co.

Styrenated Oils
Spencer Kellogg & Sons, Inc.

Tall Oils
Alkydol Laboratories, Inc.
Arizona Chemical Co.
Crosby Chemicals, Inc.
Farac Oil & Chemical Co.
T. F. McAdam
Glidden Co.
Hercules Powder Co.
Heyden-Newport Chemical Corp.
Kraft Chemical Co.

Werner G. Smith, Inc.
Union Bag & Paper Corp.
West Virginia Pulp & Paper Co.
G. S. Ziegler & Co.

Tung Oil
Degen Oil and Chemical Co.
Internatio-Rotterdam
T. F. McAdam
Werner G. Smith, Inc.

FATTY ACIDS, ESTERS AND DERIVATIVES
4

Antara Chemicals Div., General Aniline and Film Corp.
Archer-Daniels-Midland Co.
Armour Chemical Div., Armour & Co.
Atlas Powder Co.
Baker Castor Oil Co.
Crosby Chemical Co.
E. F. Drew & Co.
Emery Industries
General Mills, Chemical Div.
Glyco Products Co.
A. Gross & Co.
Harchem Div., Wallace & Tiernan, Inc.
Heyden-Newport Chemical Corp.
T. F. McAdam
Nopco Chemical Co.
Solvents and Chemicals Group
Swift & Co.
Woburn Chemical Corp.
G. S. Ziegler Co.

INTERMEDIATES
5

Anhydrides & Acids
Adipic Acid
E. I. du Pont de Nemours & Co.
Monsanto Chemical Co.
National Aniline Div., Allied Chemical Corp.

Azelaic Acid
Armour Co., Chemical Div.
Emery Industries, Inc.

Benzoic Acids
Heyden-Newport Chemical Corp.
Mallinckrodt Chemical Works
Merck & Co.
Monsanto Chemical Co.

Dicyclopentadiene
Borden Co., Chemical Div.
Enjay Co.
Union Carbide Chemicals Co.

Di & Polybasic Acids
Emery Industries, Inc.
Heyden-Newport Chemical Corp.
National Aniline Div., Allied Chemical Corp.
U. S. Industrial Chemicals Co.

Dodencenylsuccinic Anhydrides
National Aniline Div., Allied Chemical Corp.

Fumaric Acids
Chas. Pfizer & Co., Inc.
Pittsburgh Coke & Chemical Co.
Monsanto Chemical Co.
National Aniline Div., Allied Chemical Corp.

Hexahydrophthalic Anhydrides
National Aniline Div., Allied Chemical Corp.

Isophthalic Anhydrides
Oronite Chemical Co.

Maleic Anhydrides
American Cyanamid Co., Industrial Chemical Div.
Union Carbide Chemicals Co.
Monsanto Chemical Co.
National Aniline Div., Allied Chemical Corp.
Pittsburgh Coke & Chemical Co.
Reichhold Chemicals, Inc.

Naphthenic Acid
Enjay Co.
Gulf Oil Corp.
Oronite Chemical Co.
Sun Oil Co.

Pelargonic Acid
Emery Industries, Inc.

Phthalic Anhydride
American Cyanamid Co., Industrial Chemical Div.
Koppers Co., Inc., Tar Products Div.
Mallinckrodt Chemical Works
Monsanto Chemical Co.
National Aniline Div., Allied Chemical Corp.
Oronite Chemical Co.
Plastics & Coal Chemicals Div., Allied Chemical Corp.
Pittsburgh Coke & Chemical Co.
Reichhold Chemicals, Inc.

Succinic Anhydride
Monsanto Chemical Co.
National Aniline Div., Allied Chemical Corp.
Chas Pfizer & Co., Inc.

Tetrahydrophthalic Anhydrides
National Aniline Div., Allied Chemical & Dye Corp.

Trimellitic Anhydride
Amoco Chemicals Corp.

Polyols
Butanediol
Celanese Corp. of America
Union Carbide Chemicals Co.

Glycerine
Central Solvents and Chemical Co.
Dow Chemical Co.
E. F. Drew
Glycerine Corp. of America
A. Gross & Co.
Lever Bros.
Mallinckrodt Chemical Works
Shell Chemical Corp.
Solvents & Chemical Group
Swift & Co.

Pentaerythritols (Di & Tri)
Celanese Corp. of America
Commercial Solvents Co.
Gulf Oil Corp., Petrochemicals Dept.
Hercules Powder Co.
Heyden-Newport Chemical Corp.
Reichhold Chemicals, Inc.
Trojan Powder Co.

Polyhdroxy Resin
Dow Chemical Co.
Shell Chemical Co.

Sorbitol
Atlas Powder Co.
Merck & Co.

Trimethyloethane
Celanese Corp. of America
Heyden-Newport Chemical Corp.
Trojan Powder Co.

Trimethylopropane
Celanese Corp. of America
Heyden-Newport Chemical Corp.
Trojan Powder Co.

Miscellaneous
Alpha Methylstyrene
Dow Chemical Co.

Benzoguanamine
Tennesse Products and Chemical Corp.

Bisphenol A
Dow Chemical Co.

Divinylbenzene
Dow Chemical Co.
Koppers Co.

Epichlorohydrin
Dow Chemical Co.
Shell Chemical Corp.
Union Carbide Chemicals Co.

Epoxy Co-Reactants
General Mills, Chemical Div.

Formaldehyde
American Cyanamid Co., Industrial Chemical Div.
Borden Co., Chemical Div.
Celanese Corp. of America
Commercial Solvents Corp.
Heyden-Newport Chemical Corp.
Mallinckrodt Chemical Works
Monsanto Chemical Co.
Nitrogen Div., Allied Chemical Corp.
Olin Mathieson Chemical Corp.
Reichhold Chemicals, Inc.

Hexamethylenetetramine
Borden Chemical Co., Chemical Div.
E. I. du Pont de Nemours & Co.
Heyden-Newport
Mallinckrodt Chemical Works
Olin Mathieson Chemical Corp.

Methyl Esters
General Mills, Inc.

Glycols (Ethylene, etc.)
Union Carbide Chemicals Co.
Celanese Corp. of America
Dow Chemical Co.
Merck & Co.
Plastics & Coal Chemical Div., Allied Chemical Corp.
Shell Chemical Corp.
Solvents & Chemical Group

Methyl Gluoside
Corn Products Refining Co.

Organic
Pfister Chemical Wks.

Phenols
American Cyanamid Co., Organic Chemical Div.
Koppers Co.
Mallinckrodt Chemical Works
Monsanto Chemical Co.
Oronite Chemical Co.
Pittsburgh Coke & Chemical Co.
Reichhold Chemicals, Inc.

Resorcinol
Heyden-Newport Chemical Corp.
Koppers Co.
Mallinckrodt Chemical Works
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Union Carbide Chemicals Co.

Styrene Monomer
Cosden Petroleum Corp.
Dow Chemical Co.
Koppers Co.
Monsanto Chemical Co.
Union Carbide Chemicals Co.

Tar Bases & Acids
Koppers Co.
Pittsburgh Coke & Chemical Co.
Plastics & Coal Chemical Div., Allied Chemical Corp.

Ureas
American Cyanamid Co.
E. I. du Pont de Nemours & Co.
Grace Chemical Co., Div. of W. R. Grace & Co.
Mallinckrodt Chemical Works
Monsanto Chemical Co.

Vinyltoluene
Dow Chemical Co.

Rosin & Terpene Chemicals
Godfrey L. Cabot
Crosby Chemical Co.
Dixie Pine Products
Glidden Co.
Hercules Powder Co.
Heyden-Newport Chemical Corp.
Reichhold Chemicals, Inc.
Solvents and Chemicals Group
Southern Naval Stores
West Virginia Pulp & Paper Co.
G. S. Ziegler & Co.
Zophar Mills

LATEX EMULSIONS
6

Acrylic
Rohm & Haas Co.
Jersey State Chemical Co.
Union Bay State Chemical Co.

Interpolymer Type
Monsanto Chemical Co.

Latex Base
Naftone, Inc.

Polystyrene Emulsions
Dow Chemical Co.
Koppers Co., Inc., Chemical Div.
Monsanto Chemical Co.
Union Bay State Chemical Co.
Union Carbide Plastics Co.

Polyvinyl Acetate Emulsions
Borden Co.
Calvert-Mount Winans
Celanese Corp. of America (Plastics)
Colton Chemical Co.
Crownoil Chemical Co.
Dewey & Almy Chemical Co.
E. I. du Pont de Nemours & Co., (Electrochemical Dept.)
Jones-Dabney Co.
Morningstar-Paisley, Inc.
National Starch Products, Inc.
Nopco Chemical Co.
Shawinigan Resins Corp.
Reichhold Chemicals, Inc.
Union Carbide Plastics Co.
U. S. Rubber Co., Naugatuck Chemical Div.
R. T. Vanderbilt Co.

Styrene-Butadiene
Borden Co.
Dewey & Almy Chemical Co.
Dow Chemical Co.
Firestone Plastics Co.
General Tire & Rubber Co., Chemical Div.
Goodyear Tire & Rubber Co., Inc. Chemical Div.
Koppers Co., Inc., Chemical Div.
Union Bay State Chemical Co.
U. S. Rubber Co., Naugatuck Chemical Div.

Synthetic Types
California Ink Co., Inc.

Vinylidene Chloride
Dow Chemical Co.

Miscellaneous Types
Alkydol Laboratories, Inc.
Archer-Daniels-Midland Co.
Cargill, Inc.
Pennsylvania Industrial Chemicals

PIGMENTS
7

Whites
American Cyanamid Co., Pigment Div.
American Zinc Sales Co.
Godfrey L. Cabot, Inc.
Chemical & Pigment Co.
E. I. du Pont de Nemours & Co.
Eagle-Picher Co.
Glidden Co.
H. Kohnstamm & Co., Inc.
New Jersey Zinc Co.
St. Joseph Lead Co.
Sherwin-Williams Co., Pigment, Color and Chemical Div.
Titanium Pigment Corp.

Blacks
Acheson Colloids Co.
Godfrey L. Cabot, Inc.
Columbian Carbon Co.
General Carbon Co.
Harshaw Chemical Co.
J. M. Huber Corp.
H. Kohnstamm & Co., Inc.
Mineral Pigments Corp.
Reichard-Coulston, Inc.
Sid Richardson Carbon Co.
Shepherd Chemical Co.
J. Lee Smith & Co.
United Carbon Co.
R. T. Vanderbilt Co.
C. K. Williams & Co.
Witco Chemical Co.

Inorganic Types

Blues
Eagle-Picher Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
Standard Ultramarine & Color Co.
Whittaker, Clark & Daniels, Inc.

Browns & Tans
Berkshire Chemicals, Inc.
Columbian Carbon Co.
Mineral Pigments Corp.
Reichard-Coulston, Inc.
Smith Chemical & Color Co.
J. Lee Smith & Co.
C. K. Williams & Co.

Greens
Glidden Co.
Imperial Paper & Color Corp.
Mineral Pigment Corp.
C. K. Williams & Co.

Kentucky Color & Chemical Co.
Reichhold Chemicals, Inc.
Sherwin-Williams Co., Pigment, Color & Chemical Div.
Smith Chemical & Color Co.
Standard Ultramarine & Color Co.

Oranges
American Metal Climax
E. I. du Pont de Nemours & Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
Mineral Pigments Corp.
Sherwin-Williams Co., Pigment, Color & Chemical Div.

Red & Maroons
Columbian Carbon Co.
Eagle-Picher Co.
Glidden Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
Mineral Pigment Corp.
Reichard-Coulston, Inc.
Smith Chemical & Color Co.
J. Lee Smith & Co.
C. K. Williams & Co.

Yellows
Columbian Carbon Co.
E. I. du Pont de Nemours & Co.
Glidden Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
Mineral Pigments Corp.
Reichard-Coulston, Inc.
Sherwin-Williams Co., Pigment, Color & Chemical Div.
Smith Chemical & Color Co.
J. Lee Smith & Co.
Whittaker, Clark & Daniels, Inc.
C. K. Williams & Co.

Organic Types

Blues
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
E. I. du Pont de Nemours & Co.
J. S. & W. E. Eakins, Inc.
Federal Color Laboratories, Inc.
General Dyestuff Div.. General Aniline & Film Corp.
B. F. Goodrich Chemical Co., Harmon Colors
Harshaw Chemical Co.
Imperial Paper & Color Corp.
H. Kohnstamm & Co., Inc.
Kentucky Color & Chemical Co.
Mineral Pigments Corp.
Pittsburgh Coke & Chemical Co.
Sandoz
Sherpherd Chemical Co.
Sherwin-Williams Co., Pigment, Color & Chemical Div.
Standard Ultramarine & Color Co.

Browns & Tans
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
J. S. & W. E. Eakins, Inc.
General Dyestuff Div., General Aniline & Film Corp.
B. F. Goodrich Chem. Co., Harmon Colors
Harshaw Chemical Co.
Hilton-Davis Chemical Co.
H. Kohnstamm & Co., Inc.
Sandoz
Sherwin-Williams Co.

Greens
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
E. I. du Pont de Nemours & Co.
J. S. & W. E. Eakins, Inc.
Federal Color Laboratories, Inc.
General Dyestuff Corp. Div., General Aniline & Film Corp.
B. F. Goodrich Chemical Co., Harmon Colors
Harshaw Chemical Co.
Hilton-Davis Chemical Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
H. Kohnstamm & Co., Inc.
Mineral Pigments Corp.
Pittsburgh Coke & Chemical Co.
Sandoz
Shepherd Chemical Co.
Sherwin-Williams Co., Pigment, Color & Chemical Div.
Standard Ultramarine & Color Co.

Oranges
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
J. S. & W. E. Eakins, Inc.
General Dyestuff Div., General Aniline & Film Corp.
B. F. Goodrich Chemical Co., Harmon Colors
Hilton-Davis Chemical Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
H. Kohnstamm & Co., Inc.
Mineral Pigments Corp.
Sandoz
Standard Ultramarine & Color Co.

Reds & Maroons
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
E. I. du Pont de Nemours & Co.
J. S. & W. E. Eakins, Inc.
Federal Color Laboratories, Inc.
General Dyestuff Div., General Aniline & Film Corp.
B. F. Goodrich Chemical Co., Harmon Colors
Harshaw Chemical Co.
Hilton-Davis Chemical Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
H. Kohnstamm & Co., Inc.
Mineral Pigments Corp.
Sandoz
Shepherd Chemical Co.
Sherwin-Williams Co., Pigment, Color & Chemical Div.
Standard Ultramarine & Color Co.

Yellows
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
J. S. & W. E. Eakins, Inc.
E. I. du Pont de Nemours & Co.
Federal Color Laboratories, Inc.
General Dyestuff Div., General Aniline & Film Corp.
B. F. Goodrich Chemical Co., Harmon Colors
Harshaw Chemical Co.
Hilton-Davis Chemical Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
H. Kohnstamm & Co., Inc.
Mineral Pigments Corp.
Sandoz
Shepherd Chemical Co.
Standard Ultramarine & Color Co.

Lakes & Toners
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
Collway Colors, Inc.
E. I. du Pont de Nemours & Co.
J. S. & W. E. Eakins, Inc.
General Dyestuff Div., General Aniline & Film Corp.
B. F. Goodrich Chemical Co., Harmon Colors
Harshaw Chemical Co.
Hilton-Davis Chemical Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
H. Kohnstamm & Co., Inc.
Mineral Pigments Corp.
Magruder Color Co., Inc.
Pittsburgh Coke & Chemical Co.
Sandoz
Sherwin-Williams Co., Pigment, Color & Chemical Div.
Standard Ultramarine & Color Co.

Dispersions
Acheson-Colloids Co.
American Cyanamid Co., Pigment Div.
Ansbacher-Siegle Corp.
California Ink Co., Inc.
Carbon Dispersions, Inc.
Claremont Dispersion
Columbian Carbon Co.
B. F. Goodrich Chemical Co., Harmon Colors
Goodyear Tire & Rubber Co., Inc. Chemical Div.
Harshaw Chemical Co.
Harwick Standard Chemical Co.
Hilton-Davis Chemical Co.
Imperial Paper & Color Corp.
Kentucky Color & Chemical Co.
H. Kohnstamm & Co., Inc.
Kromall Chemical & Dispersions Corp.
Pennsylvania Color & Chemical Co.
R-B-H Dispersions, Div. of Interchemical Corp.
Sherwin-Williams Co., Pigment, Color & Chemical Div.
J. Lee Smith & Co.
Thibaut & Walker Co., Inc.
Whittaker, Clark & Daniels, Inc.

Metallic

Aluminum Pastes & Powders
Aluminum Co. of America
Magna Mfg. Co.
Metalead Products Corp.

Metals Disintegrating Co.
Reynolds Metals
Silberline Manufacturing Co., Inc.
U. S. Bronze Powder Wks.

Bronze Powders
Aluminum Co. of America
Magna Mfg. Co.
Metals Disintegrating
U. S. Bronze Powder Wks.

Green Gold Type
E. I. du Pont de Nemours & Co.

Stainless Steel
Charles J. Hardy, Inc.

Zinc Dust
New Jersey Zinc Co.

Non-Toxic Colorants
H. Kohnstamm & Co., Inc.

Extenders & Fillers
Berkshire Chemicals, Inc.
Godfrey L. Cabot, Inc.
Carbola Chemical Co., Inc.
Chemical & Pigment Co.
Concord Mica Corp.
De Lore Div., National Lead Co.
Diamond Alkali Co.
English Mica Co.
Franklin Mineral Products Co.
Georgia Kaolin Co.
Georgia Marble Co.
Great Lakes Carbon Corp.
Hayden Mica Co.
J. M. Huber Corp.
International Talc Co., Inc.
H. Kohnstamm & Co., Inc.
Johns-Manville Sales Corp.
Marine Magnesium Div., Merck & Co.
Minerals & Chemicals Corp. of America
Sherwin-Williams Co.
Smith Chemical & Color Co.
Tamms Industries, Inc.
Tennessee Products & Chemical Corp.
R. T. Vanderbilt Co.
Whittaker, Clark & Daniels, Inc.
C. K. Williams & Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

Fluorescent
General Dyestuff Div., General Aniline & Film Corp.
Imperial Paper & Color Co.
Lawter Chemicals Inc.
New Jersey Zinc Sales Co.

Flush Colors
American Cyanamid Pigment Div.
Ansbacher-Siegle Corp.
Federal Color Laboratories, Inc.
General Dyestuff Div., General Aniline & Film Corp.
Harwick Standard Chemical Co.
Hilton-Davis Chemical Co.
Holland Color & Chemical Co.
Sherwin-Williams Co.
Standard Ultramarine & Color Co.
Whittaker, Clark & Daniels, Inc.

Pearl Essence
Mearl Corp.
Rona Laboratories, Inc.

Umbers and Siennas
Mineral Pigments Corp.
Smith Chemical & Color Co.
J. Lee Smith & Co.
Reichard-Coulston Inc.
C. K. Williams & Co.

PLASTICIZERS
8

Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Alkydol Laboratories, Inc.
Archer-Daniels-Midland Co.
Armour Chemical Div., Armour & Co.
Atlas Powder Co.
Baker Castor Oil Co.
Cambridge Industries Co., Inc.
Celanese Corp. of America, Chemical Div.
Commercial Solvents Corp.
Diamond Alkali Co.
E. F. Drew & Co.
Eastman Chemical Products, Inc.
Emery Industries, Inc.
B. F. Goodrich Chemical Co.
Harchem Div., Wallace & Tiernan Co.
Harwick Standard Chemical Co.
Hercules Powder Co.
Kolker Chemical Corp.
Monsanto Chemical Co.
Naftone, Inc.
Neville Chemical Co.
Ohio-Apex Div., Food Machinery & Chemical Corp.
Pennsylvania Industrial Chemical Co.
Chas. Pfizer & Co., Inc.
Pittsburgh Coke & Chemical Co.
Plastics & Coal Chemicals, Div. of Allied Chemical Corp.
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Solvents and Chemicals Group
Tennessee Products & Chemical Corp.
Union Carbide Chemical Co.
Witco Chemical Co.
G. S. Ziegler & Co.

RESINS
9

Acrylics
American Cyanamid Co., Organic Chemicals Div.
Borden Co., Chemical Div.
E. I. du Pont de Nemours and Co.
General Aniline & Film Corp.
Naugatuck Chemical Div., U. S. Rubber Co.
Rohm & Haas Co.

Alkyds
Adco Chemical Co.
Alkydol Laboratories
American Cyanamid Co., Plastics & Resin Div.
American Alkyd Industries
Archer-Daniels-Midland Co.
Basic Varnish & Research Corp.
California Ink Co., Inc.
Cambridge Industries Co.
Cargill, Inc.
Crosby Chemicals
Crownoil Chemical Co.
Farac Oil & Chemical Co.
Farnow, Inc.
Freeman Chemical Corp.
Hercules Powder Co.
Hilton-Davis Chemical Co.
Jones-Dabney Co.
Kraft Chemical Co.
McCloskey Varnish Co.
Plastics and Coal Chemical Div, Allied Chemical Corp.
Price Varnish Co.
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Schenectady Varnish Co.
Sherwin-Williams Co.
Specialty Resin Co.
Fred'k A. Stressen-Reuter Inc.
Synvar Corp.
Thibaut & Walker Co., Inc.
U. S. Coatings Corp.
T. F. Washburn Co.

Cellulosics
Dow Chemical Co.
E. I. du Pont de Nemours & Co.
Eastman Chemical Products, Inc.
Hercules Powder Co.

Chlorinated Rubber
Hercules Powder Co.

Coumarone-Indene
Neville Chemical Co.
Plastics and Coal Chemical Div., Allied Chemical Corp.
Price Varnish Co.
Pennsylvania Industrial Chemical Corp.

Cyclized Rubber
Alkydol Laboratories, Inc.
Goodyear Tire & Rubber Co., Inc.

Cyclopentadiene
R-B-H Dispersions, Div. of Interchemical Corp.

Epoxy
Alkydol Laboratories, Inc.
Dow Chemical Co.
Ciba Co., Inc.
Freeman Chemical Corp.
Jones-Dabney Co.
Reichhold Chemicals, Inc.
Schenectady Varnish Co.
Shell Chemical Corp.
Sherwin-Williams Co.
Union Carbide Plastics Co.

Epoxy Esters
Farnow, Inc.
McCloskey Varnish Co.
T. F. Washburn Co.

Ester Gum Solutions
Alkydol Laboratories, Inc.
Crosby Chemicals, Inc.

Crownoil Chemical Co.
Glidden Co.
Hercules Powder Co.
C. J. Osborn Co.
Pine Chemicals, Inc.
Reichhold Chemicals, Inc.
Synvar Corp.

Fumaric
Alkydol Laboratories, Inc.
Filtered Rosin Products, Inc.
C. J. Osborn Co.
Reichhold Chemicals, Inc.
Schenectady Resins

Hydrocarbons
Alkydol Laboratories, Inc.
Allied, Asphalt & Mineral Corp.
American Gilsonite Co.
Amoco Chemicals Corp.
Cosden Petroleum Corp.
Koppers Co., Tar Products Div.
Neville Chemical Co.
Pennsylvania Industrial Chemical Corp.
R-B-H Dispersions, Div. of Interchemical Corp.
Velsicol Chemical Corp.
G. S. Ziegler & Co.

Isocyanates
Carwin Co.
E. I. du Pont de Nemours & Co.
Mobay Chemical Co.
National Aniline Div., Allied Chemical Corp.

Melamines
American Cyanamid Co., Plastics & Resins Div.
Monsanto Chemical Co.
Plastics and Coal Chemical Div., Allied Chemical Corp.
Reichhold Chemicals, Inc.
Rohm & Haas Co.

Maleics
Alkydol Laboratories, Inc.
Crosby Chemicals, Inc.
Crownoil Chemical Co.
Hercules Powder Co.
Jones-Dabney Co.
Naugatuck Chemical Div., U. S. Rubber Co.
C. J. Osborne Co.
Plastics and Coal Chemical Div., Allied Chemical Corp.
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Schenectady Varnish Co.
Sherwin-Williams Co.

Natural Resins
Acme Shellac Products Co.
Gillespie-Rogers-Pyatt Co., Inc.
Haeuser Shellac Co.
Hercules-Powder Co.
Heyden-Newport Chemical Corp.
O. G. Innes Corp.
Internatio-Rotterdam Inc.
Reichhold Chemicals, Inc.
Thibaut & Walker Co., Inc.
William Zinsser & Co.

Nitrocellulose Solutions
Cellofilm Industries, Inc.

Phenolics
Alkydol Laboratories, Inc.
American Cyanamid Co., Plastics & Resins Div.
Crownoil Chemical Co.
Farnow, Inc.
General Electric Co., Chemical Materials Dept.
Hercules Powder Co.
Krumbhaar Chemicals, Inc.
McCloskey Varnish Co.
Monsanto Chemical Co.
Plastics and Coal Chemicals Div., Allied Chemical Corp.
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Schenectady Varnish Co.
Synvar Corp.
Union Carbide Plastics Co.
Varcum Chemical Corp.

Polyamides
General Mills, Inc.

Polybutenes
Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.
Amoco Chemicals Corp.
Cosden Petroleum Corp.
Enjay Co.
Naftone, Inc.
Oronite Chemical Co.
Phillips Petroleum Co.

Polyesters
Alkydol Laboratories, Inc.
American Cyanamid Co., Plastics & Resins Div.
Archer-Daniels-Midland Co.
Atlas Powder Co.
E. I. du Pont de Nemours & Co.
Freeman Chemical Corp.
Mobay Chemical Co.
Naugatuck Chemical Div., U. S. Rubber Co.
Plastics and Coal Chemical Div., Allied Chemical Corp.
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Schenectady Varnish Co.
Specialty Resins Co.
Union Carbide Plastics Co.

Polystyrenes
Dow Chemical Co.
Koppers Co.
Marbon Chemical, Div. of Borg-Warner
Monsanto Chemical Co.
Naugatuck Chemical Div., U. S. Rubber Co.
Pennsylvania Industrial Chemical Corp.
Union Carbide Plastics Co.

Polyurethanes
Cargill, Inc.
Spencer Kellogg and Sons, Inc.

Silicones
Dow Corning Corp.
General Electric, Chemical Materials Dept.
Silicone Div., Union Carbide Corp.

Styrene Copolymers
Dewey & Almy Chemical Co.
General Tire & Rubber Co.
B. F. Goodrich Chemical Co.
Goodyear Tire & Rubber Co., Inc., Chemical Div.
Koppers Co.
Monsanto Chemical Co.
Naugatuck Chemical Div., U. S. Rubber Co.
Union Carbide Plastics Co.

Synthetic Rubber(Hypalon)
E. I. du Pont de Nemours & Co., Elastomers Div.

Terpenes
Crosby Chemical Co.
Hercules Powder Co.
Glidden Co.
Newport Industries, Div. Heyden-Newport Chemical Corp.
Pennsylvania Industrial Chemical Corp.
Schenectady Varnish Co.

Thixotropic Vehicles
T. F. Washburn Co.

Ureas
American Cyanamid Co., Plastics & Resins Dept.
Jones-Dabney Co.
Monsanto Chemical Co.
Plastics and Coal Chemical Div., Allied Chemical Corp.
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Sherwin-Williams Co.

Vinyls
Borden Co., Chemical Div.,
Colton Chemical Co.
Dow Chemical Co.
E. I. du Pont de Nemours & Co.
Firestone Plastics Co., Div. of Firestone Tire & Rubber Co.
General Aniline & Film Corp.
B. F. Goodrich Chemical Co.
Goodyear Tire & Rubber Co., Inc.
Monsanto Chemical Co.
National Starch Products, Inc.
Naugatuck Chemical Div., U. S. Rubber Co.
Reichhold Chemicals, Inc.
Shawinigan Resins Corp.
Union Carbide Plastics Co.

Vinyl Acetate Solutions
Cellofilm Industries, Inc.

Water Thinned Resins
Archer-Daniels Midland Co.

SOLVENTS
10

Aliphatics
American Mineral Spirits Co.
R. J. Brown Co.
Central Solvents and Chemical Co.
Continental Oil Co.
Eastern States Chemical Corp.
Esso Standard Oil Co.
Fallek Products Co.
Penola Oil Co.
Phillips Petroleum Co.
Shell Oil Co.
Skelly Oil Co.
Socony Mobil Oil Co., Inc.
Solvents and Chemicals Group
Standard Oil Co. of Ohio

Aromatics
American Mineral Spirits Co.
Anderson-Prichard Oil Corp.
Atlantic Refining Co.
R. J. Brown Co.
Central Solvents and Chemical Co.
Cosden Petroleum Corp.
Dow Chemical Co.
Eastern States Chemical Corp.
Esso Standard Oil Co.
Fallek Products Co.
Neville Chemical Co.
Pennsylvania Industrial Chemical Corp.
Penola Oil Co.
Pittsburgh Coke & Chemical Co.
Phillips Petroleum Co.
Plastics and Coal Chemical Div., Allied Chemical Corp.
Shell Oil Co.
Sinclair Chemicals, Inc.
Solvents and Chemicals Group
Sun Oil Co.
United States Steel Corp.
Velsicol Chemical Corp.

Halogen-Containing
Central Solvents and Chemical Co.
Columbia-Southern Chemical Corp.
Diamond Alkali Co.
Dow Chemical Co.
E. I. du Pont de Nemours & Co.
Kolker Chemical Corp.
Olin Mathieson Chemical Corp.
Solvents and Chemicals Group
Wyandotte Chemical Corp.

Naphthas
American Mineral Spirits Co.
Central Solvents and Chemical Co.
Eastern States Chemical Corp.
Esso Standard Oil Co.
Neville Chemical Co.
Pennsylvania Industrial Chemical Corp.
Penola Oil Co.
Phillips Petroleum Co.
Pittsburgh Coke & Chemical Co.
Shell Oil Co.
Sinclair Chemicals, Inc.
Skelly Oil Co.
Socony Mobil Oil Co., Inc.
Solvents & Chemicals Group
Standard Oil Co. of Ohio

Nitroparaffins
Commercial Solvents Corp.

Odorless and Low-Odor Solvents
American Mineral Spirits Co.
Anderson-Prichard Oil Corp.
R. J. Brown Co.
Central Solvents and Chemical Co.
Enjay Co., Inc.
Phillips Petroleum Co.
Shell Oil Co.
Sinclair Chemicals, Inc.
Socony Mobil Co., Inc.
Standard Oil Co. of Ohio

Oxygen-Containing
Celanese Corp. of America, Chemical Div.
Central Solvents and Chemical Co.
Commercial Solvents Corp.
E. I. du Pont de Nemours & Co.
Eastman Chemical Products, Inc.
Enjay Co., Inc.
Hercules Powder Co.
National Aniline Div., Allied Chemical Corp.
Pennsalt Manufacturing Co., Industrial Div.
Plastics and Coal Chemicals, Div. of Allied Chemical Corp.
Publicker Industries, Inc.
Solvents & Chemicals Group
Shell Chemical Corp.
U. S. Industrial Chemicals Co.
Union Carbide Chemical Co.

Turpentines
Crosby Chemicals, Inc.
Glidden Co.
Guignon & Green, Inc.
Hercules Powder Co.
Heyden-Newport Chemical Corp.
Sherwin-Williams Co.
Solvents and Chemicals Group
Southern States Chemical Co.

PRODUCTION EQUIPMENT
11

Azeotropic Systems
Brighton Copper Works
Blaw-Knox Co., Buflovak Equipment Div.

Ball & Pebble Mills
Abbe Engineering Co.
Paul O. Abbe, Inc.
Baker Perkins
Epworth Mfg. Co.
Patterson Foundry & Machine Co. Div. of Ferro Corp.
U. S. Stoneware Co.

Barrell Rollers
Abbe Engineering Co.
Paul O. Abbe, Inc.
U. S. Stoneware Co.

Blenders
Abbe Engineering Co.
Paul O. Abbe, Inc.
Patterson Foundry & Machine Co. Div. of Ferro Corp.
Patterson-Kelley Co.
Read-Standard Corp.
Charles Ross & Son Co.

Cleaning Machines
Karl Kiefer Machine Co.

Colloid Mills
Abbe Engineering Co.
Gifford-Wood Co.
Kinetic Dispersion Corp.
Manton-Gaulin Mfg. Co.
Morehouse-Cowles, Inc.
The Pfaudler Co.
Tri-Homo Corp.
Troy Engine & Machine Co.

Carbon Dioxide
C. M. Kemp Mfg. Co.
Liquid Carbonic Corp.

Coding Machines
J. M. Lehmann Co.
James H. Matthews & Co.

Dissolvers
Abbe Engineering Co.
Baker-Perkins
Morehouse-Cowles, Inc.
Patterson Foundry & Machine Co. Div. of Ferro Corp.
Charles Ross & Son Co.

Dowtherm Kettles
Brighton Copper Works
Blaw-Knox Co., Buflovak Equipment Div.
Process Eng. & Mach. Co.

Drum Reconditioners
L. M. Gilbert Co.

Drum Mixers
Abbe Engineering Co.
U. S. Stoneware Co.

Drum Rollers
Abbe Engineering Co.
U. S. Stoneware Co.

Dust Removal Systems
Panygorn Corp.
Wheelabrator Corp.

Filling Machines
C. M. Ambrose Co.
Bowser, Inc.

Hope Machine Co.
Karl Kiefer Machine Co.

Filters
Cuno Engineering Corp.
Filpaco Industries
Filter Fabrics, Inc.
Hercules Filter Corp.
Sparkler Mfg. Co.

Filtering Aids
Great Lakes Carbon Corp., Dicalite Div.
Johns-Manville Sales Corp.

Filter Press
Biach Industries, Inc.
Sparkler Mfg. Co.

Fume Removal Systems
Catalytic Combustion Corp.
Doyle Vacuum Cleaner Co.
Claude B. Schneible Co.
Schutte and Koerting Co.

Gaskets
U. S . Stoneware Co.

Grinding Media
Abbe Engineering Co.
Paul O. Abbe, Inc.
Coors Porcelain Co.
Diamonite
LZP Industrial Ceramics Co.
McDanel Refractory Porcelain Co.
Porcelain Div. Ferro Corp.
The Pennebacker Co.
U. S. Stoneware Co.

Inert Gas Generators
C. M. Kemp Mfg. Co.
Liquid Carbonic Corp.

Jar Rolling Machines
Abbe Engineering Co.
Paul O. Abbe, Inc.
U. S. Stoneware Co.

Labelling Machines
Chisholm-Ryder Co. of Pennsylvania
King Sales & Engineering Co.

Laboratory Jar Rolling Mills
Abbe Engineering Co.
Paul O. Abbe Co.
U. S. Stoneware Co.

Liquid Depth Indicators
Petrometer Corp.

Mill Head Assemblies
McDanel Refractory Porcelain Co.

Mill Jars
Abbe Engineering Co.
Paul O. Abbe Co.
U. S. Stoneware Co.

Mill Linings
Abbe Engineering Co.
Paul O. Abbe, Inc.
Diamonite
LZP Industrial Ceramics Co.
McDanel Refractory Porcelain Co.
Porcelain Div. Ferro Corp.

Mixers & Agitators
Abbe Engineering Co.
Paul O. Abbe, Inc.
Baker Perkins, Inc.
Brighton Copper Works
Cincinnati Hildebrand Co.
J. H. Day Co.
Eastern Industries, Inc.
Epworth Mfg. Co.
Herman Hockmeyer & Co.
International Engineering Corp.
Kinetic Dispersion Corp.
J. M. Lehmann Co., Inc.
Mixing Equipment Co.
Patterson Foundry & Machine Co.
Div. of Ferro Corp.
Read Standard Corp.
Charles Ross & Son Co.
F. J. Stokes Corp.
Troy Engine & Machine Co.

Positive Displacement Meter
Bowser, Inc.

Pumps
Blackmer Pump Co.
Foster Pump Works, Inc.

Refractories (Heating)
Selas Corp. of America

Resin & Varnish Kettles
Blaw-Knox
Buflovak Equip., Div. of Blaw-Knox Co.
Brighton Copper Works
Patterson Foundry & Machine Co.
Div. of Ferro Corp.

Rollers For Barrels
Abbe Engineering Co.
Paul O. Abbe, Inc.

Roller Mills
Buhler Bros.
Chemical & Pharmaceutical Industry Co., Inc.
J. H. Day Co.
J. M. Lehmann Co., Inc.
Kent Machine Works, Inc.
Charles Ross & Son Co.
Troy Engine & Machine Co.

Sieving & Screening Machines
Abbe Engineering Co.
J. M. Lehmann Co., Inc.

Specific Gravity Indicator
Petrometer Corp.

Strainers
C. M. Ambrose Corp.
Cuno Engineering Corp.
J. M. Lehmann Co.

Thinning & Tinting Tank
Abbe Engineering Co.
Paul O. Abbe Co.
Cincinnati Hildebrand Co.
J. H. Day Co.
Herman Hockmeyer Co.
Kent Machine Works
J. M. Lehmann Co.
Charles Ross & Son Co.

Tumblers
Abbe Engineering Co.
Paul O. Abbe, Inc.

Used Equipment
Machinery & Equipment Co.

MATERIAL HANDLING 12

Barksdale Company
Barrett-Cravens Co.
Carrier Conveyor Corporation
Clark Equipment Company
The Elwell-Parker Electric Company
Sterling Fleischman Co.
Hyster Company
Market Forge Company
Neptune Meter Company
The Rapids-Standard Co., Inc.
Read Standard Corporation
Revolvator Company
Stewart-Warner Corporation
Yale & Towne Mfg. Co.

CONTAINERS, PAILS and CANS 13

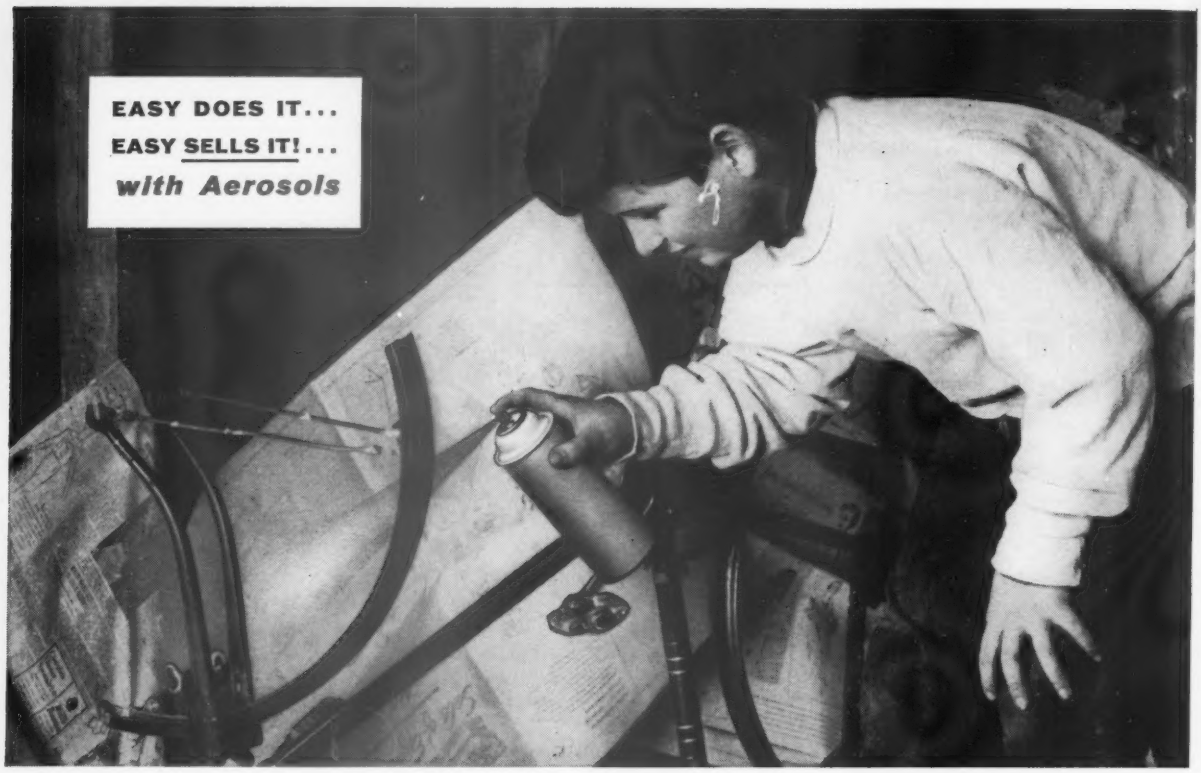
Aluminum Co. of America
American Can Co.
Bennett Industries, Inc.
Continental Can Co., Inc.
Crown Cork & Seal Co., Inc., Can Div.
The Davies Can Co.
Fein's Tin Can Co., Inc.
Geuder-Paeschke & Frey Co.
Inland Steel Container Co.
Jones & Laughlin Steel Corp.
Milton Can Co.
National Can Corp.
National Steel Container Co.
Pressed Steel Tank Co.
Rheem Mfg. Co.
Southwestern Steel Container Co.
Div. of Vulcan Steel Container Co.
Stern Can Co.
United States Steel Products, Container Div.
Vulcan Container, Inc.
Vulcan Steel Container, Inc.

TESTING EQUIPMENT
14

Atlas Electric Devices
Bausch & Lomb Optical Co.
Beckman Instruments
Brookfield Engineering Laboratories, Inc.
Burrell Corp.
Erichsen
Fisher Scientific Co.
M. F. Fawcett Co.
Gardner Laboratories, Inc.
The Emil Greiner Co.
Hellige, Inc.
Macbeth Corp. & Subsidiaries
Morest Co.
Norcross Corp.
Photovolt Corp.
Precision Scientific Co.
Taber Instrument Corp.
Universal Aviation Equip., Inc.

COLOR CARDS
15

Colwell Press, Inc.
Gorr Color Card, Inc.
Matherson-Selig
Strobridge Color Card
White Color Card



Magic Touch of Aerosol Packaging opens bigger markets for touch-up paints

"It's faster," say consumers. "It's easier. It's neater." These advantages of aerosol paints sold over 30.5 million cans in 1957—more than half again as many as in 1956!—and the market is still growing fast!

The paint field is now seeing the same kind of revolutionary sales impact that aerosol packaging has had on hair sprays and insecticides, shave creams and room deodorants. And if *you're* thinking of marketing aerosol paints or any other product in aerosol form, we'd like to help.

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As a leading producer of aerosol propellants, General Chemical provides a great many helpful services to present and prospective aerosol marketers. We will, for example, be glad to work with you to develop a formulation with the right pressures and compatibilities for your product and container.

We will direct you to many capable contract fillers in every part of the country who will put up your product in aerosol form for test marketing and handle full commercial production as well. In this way, you can enter the aerosol marketplace without investing a cent in plant, special equipment or production personnel!

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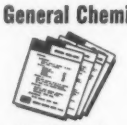
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AEROSOL SUPPLIERS' DIRECTORY

AGITATING BALLS

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Box 401
Sterling, Ill.

CAN UNSCRAMBLERS

Chisholm-Ryder Co. of Pennsylvania
Blettner Ave.
Hanover, Pa.

Arthur Colton Co., Div.
Snyder Tool & Engineering Co.
3598 E. Lafayette
Detroit 7, Mich.

Food Machinery & Chemical Corp.
342 W. Julian St.
San Jose 6, Calif.

Mojonnier Associates, Inc.
9151 Fullerton Ave.
Franklin Park, Ill.

CAPPING EQUIPMENT

Arenco Machine Co.
25 W. 43rd St.
New York 36, N. Y.

Builders Sheet Metal Works, Inc.
108 Wooster St.
New York 12, N. Y.

Burt Machine Co.
401 E. Oliver St.
Baltimore 2, Md.

Tite-Cap Machine Div.
Canning Machinery Co.
5105 S. W. 45th Ave.
Portland 1, Ore.

CLEANING & PURGING EQUIPMENT

Chisholm-Ryder Co. of Pennsylvania
Blettner Ave.
Hanover, Pa.

Arthur Colton Co., Div.
Snyder Tool & Engineering Co.
3598 E. Lafayette
Detroit 7, Mich.

Continental Can Co.
100 E. 42nd St.
New York 14, N. Y.

Crown Cork & Seal Co., Inc.
Can Div.
9300 Ashton Rd.
Philadelphia 36, Pa.

Hope Machine Co.
9400 State Road
Philadelphia 4, Pa.

Karl Kiefer Machine Co.
919 Martin St.
Cincinnati 2, Ohio

Mojonnier Associates, Inc.
9151 Fullerton Ave.
Franklin Park, Ill.

CODING DEVICES

American Marking Corp.
71 Lock St.
Newark 1, N. J.

Hope Machine Co.
9400 State Road
Philadelphia 14, Pa.

Kiwi Coders Corp.
4027 N. Kedzie Ave.
Chicago 18, Ill.

John R. Nalbach Eng. Co.
6139 Ogden Ave.
Chicago 50, Ill.

COMPRESSORS

Arthur Colton Co., Div.
Snyder Tool & Engineering Co.
3598 E. Lafayette
Detroit 7, Mich.

Chicago-Pneumatic Tool Co.
8 E. 44th St.
New York 17, N. Y.

Ingersoll-Rand
11 Broadway
New York 4, N. Y.

The Wallace Co.
41 California St.
Bridgeport, Conn.

CONTAINERS

Aluminum

Aluminum International, Inc.
1855 Blake St.
Denver 15, Colo.

Aluminum Co. of America
Alcoa Building
Pittsburgh 19, Pa.

Continental Can Co.
100 E. 42nd St.
New York 14, N. Y.

Emson Research, Inc.
118 Burr Court
Bridgeport 5, Conn.

Peerless Tube Corp.
58 Locust Ave.
Bloomfield, N. J.

Pegasus International Corp.
1 E. 53rd St.
New York 22, N. Y.

Risdon Manufacturing Co.
Box 520
Naugatuck, Conn.

White Metal Mfg. Co.
1012 Grand St.
Hoboken, N. J.

Stainless Steel

Emson Research, Inc.
118 Burr Court
Bridgeport 5, Conn.

Risdon Manufacturing Co.
Box 520
Naugatuck, Conn.

Tin and Black Plate

American Can Co.
100 Park Ave.
New York, N. Y.

Continental Can Co.
100 E. 42nd St.
New York 14, N. Y.

Crown Cork & Seal Co., Inc.
Can Division
9300 Ashton Rd.
Philadelphia 36, Pa.

COVER CAPS AND CLOSURES

Armstrong Cork Co.
5403 Cornell Ave.
Lancaster, Pa.

Clayton Corp.
4205 Forest Park Blvd.
St. Louis 8, Mo.

Eastern Cap & Closure Co.
725 N. Haven St.
Baltimore 5, Md.

Gilbert Plastics, Inc.
1415 Chestnut Ave.
Hillside 5, N. J.

L & H Plastics, Inc.
189 Webster Ave.
Bridgeport 7, Conn.

Line Novelty Mfg. Co.
P. O. Box 1386
Waterbury 20, Conn.

Ludwig Closures
185 Oakland St.
Brooklyn 22, N. Y.

Monroe-Danford & Co.
50 48th St.
Weepawken, N. J.

Pegasus International Corp.
1 E. 53rd St.
New York 22, N. Y.

Precision Valve Corp.
700 Nepperhan Ave.
Yonkers 3, N. Y.

Risdon Mfg. Co.
Box 520
Naugatuck, Conn.

Valve Corp. of America
1720 Fairfield Ave.
Bridgeport, Conn.

Walter Frank Organization
4100 Warren Ave.
Hillside, Ill.

West Penn Mfg. & Supply Corp.
809 Second Ave.
Brackenridge, Pa.

Wheeling Stamping Co.
2116 Water St.
Wheeling, W. Va.

A. H. Wirz, Inc.
Fourth & Townsend Sts.
Chester, Pa.

DIP TUBING

Anchor Plastics
30-36 36th St.
Long Island City, N. Y.

Hydrawlik Co.
131 E. First Ave.
Roselle, N. J.

Jordan Manufacturing Co.
Des Plaines, Ill.

Walter Frank Organization
4100 Warren Ave.
Hillside, Ill.

FILLERS

Arthur Colton Co. Div.
Snyder Tool & Engineering Co.
3598 E. Lafeyette
Detroit 7, Mich.

Elgin Manufacturing Co.
200 Brook St.
Elgin, Ill.

Ertel Engineering Corp.
8-14 N. Front St.
Kingston 8, N. Y.

Hope Machine Co.
9400 State Road
Philadelphia 14, Pa.

Karl Kiefer Machine Co.
919 Martin St.
Cincinnati 2, Ohio

Mojonnier Associates, Inc.
9151 Fullerton Ave.
Franklin Park, Ill.

The Pfaudler Co., Div.
Pfaudler Permutit, Inc.
Clark St.
Rochester 3, N. Y.

FILLING LINES

Builders Sheet Metal Works, Inc.
108 Wooster St.
New York 12, N. Y.

Arthur Colton Co., Div.
Snyder Tool & Engineering Co.
3598 E. Lafayette
Detroit 7, Mich.

Karl Kiefer Machine Co.
919 Martin St.
Cincinnati 2, Ohio

LeMay Machine Co.
276 LeMay Ferry Road
St. Louis 23, Mo.

Mojonnier Associates, Inc.
9151 Fullerton Ave.
Franklin Park, Ill.

John R. Nalback Engineering Co.
6139 Ogden Ave.
Chicago 50, Ill.

Oil Equipment Laboratories
600 Pearl St.
Elizabeth, N. J.

The Wallace Co.
41 California St.
Bridgeport, Conn.

FILTERS

Ertel Engineering Corp.
8-14 N. Front St.
Kingston 8, N. Y.

Karl Kiefer Machine Co.
919 Martin St.
Cincinnati 2, Ohio

GASKETS

Bristol Flowed Gasket Co.
P. O. Box 382
Southington, Conn.

Crown Cork & Seal Co., Inc.
Can Div.
9300 Ashton Rd.
Philadelphia 36, Pa.

Dewey & Almy Chemical Div.
W. R. Grace & Co.
62 Whittemore Ave.
Cambridege 40, Mass.

Stearling Seal Co.
316 West 16th St.
Erie, Pa.

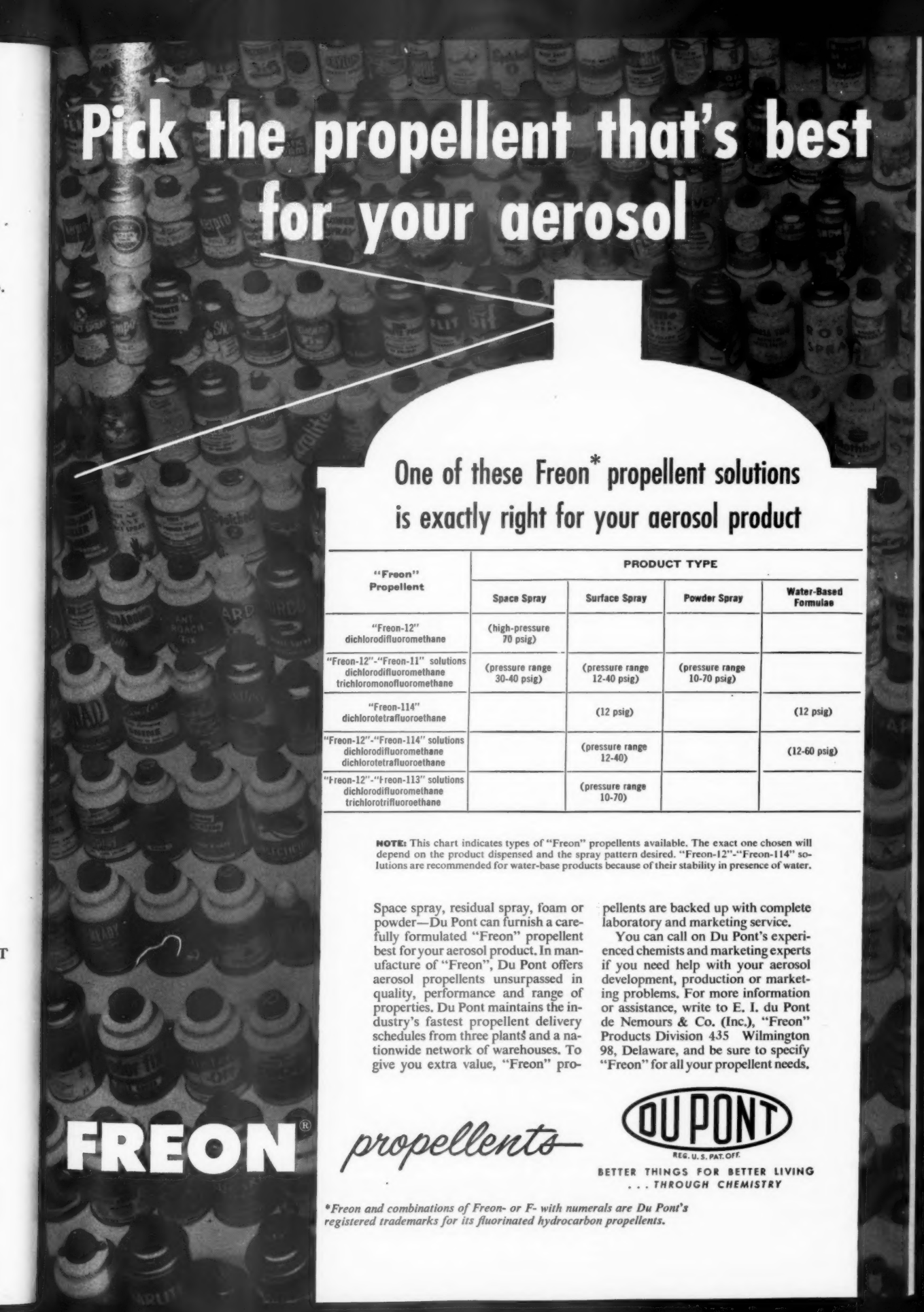
LEAK DETECTING EQUIPMENT

Builders Sheet Metal Work, Inc.
108 Wooster St.
New York 12, N. Y.

Arthur Colton Co., Div.
Snyder Tool & Engineering Co.
3598 E. Lafayette
Detroit 7, Mich.

General Electric Co.
1 River Rd.
Schenectady, N. Y.

Mine Safety Appliances Co.
230 North Braddock Ave.
Pittsburgh 8, Pa.



Pick the propellent that's best for your aerosol

One of these Freon* propellent solutions is exactly right for your aerosol product

"Freon" Propellent	PRODUCT TYPE			
	Space Spray	Surface Spray	Powder Spray	Water-Based Formulae
"Freon-12" dichlorodifluoromethane	(high-pressure 70 psig)			
"Freon-12"-"Freon-11" solutions dichlorodifluoromethane trichloromonofluoromethane	(pressure range 30-40 psig)	(pressure range 12-40 psig)	(pressure range 10-70 psig)	
"Freon-114" dichlorotetrafluoroethane		(12 psig)		(12 psig)
"Freon-12"-"Freon-114" solutions dichlorodifluoromethane dichlorotetrafluoroethane		(pressure range 12-40)		(12-60 psig)
"Freon-12"-"Freon-113" solutions dichlorodifluoromethane trichlorotrifluoroethane		(pressure range 10-70)		

NOTE: This chart indicates types of "Freon" propellents available. The exact one chosen will depend on the product dispensed and the spray pattern desired. "Freon-12"-"Freon-114" solutions are recommended for water-base products because of their stability in presence of water.

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You can call on Du Pont's experienced chemists and marketing experts if you need help with your aerosol development, production or marketing problems. For more information or assistance, write to E. I. du Pont de Nemours & Co. (Inc.), "Freon" Products Division 435 Wilmington 98, Delaware, and be sure to specify "Freon" for all your propellent needs.

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NEW YORK
Commercial Chemicals, Inc.
211 Hertel Avenue
Buffalo 7
D. H. Litter Company
114 East 16th Street
New York 3
Raw Materials Company
220 East 42nd Street
New York 17
Commercial Chemicals, Inc.
36 Winthrop Street
Rochester 7

NORTH CAROLINA
Deeks & Company
H. P. T. and D. R. R. Bldg.
High Point

OHIO
Theodore C. Kiesel
P.O. Box 93
Cincinnati 13

Henry L. Grund, Inc.
406 Bulkley Building
Cleveland 15

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon Avenue
Portland 10

PENNSYLVANIA
John D. Butts
926 Grant Building
Pittsburgh 19

TENNESSEE
Robert F. Sheahan Co.
198 S. Main Street
P.O. Box 2654
Memphis 2

TEXAS
Van Waters & Rogers, Inc.
P.O. Box 1188
10216 Denton Road
Dallas 9
Van Waters & Rogers, Inc.
5403 Kirby Drive
Houston 5

UTAH
Van Waters & Rogers, Inc.
Braun-Knecht-Heimann Co.
650 West 8th South
Salt Lake City

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue South
Seattle 4
Van Waters & Rogers, Inc.
North 809 Washington
Spokane 1

The California Ink Company, Inc.

GEORGIA
Deeks and Company
1101 Zonolite Road, N. E.
Atlanta

ILLINOIS
J. W. Van Tuin Company
588 Lincoln Avenue
Chicago 45

MINNESOTA
M. H. Baker Company
1645 Hennepin Avenue
Minneapolis 3

MISSOURI
Hobart Gillespie
5829 McGee Street
Kansas City

NEW YORK
D. B. Becker Company
150 Nassau Street
New York 38

OHIO
Deeks and Company
6433 Wiehe Road
Golf Manor
Cincinnati 13
Dimlich-Radcliffe Co.
13125 Shaker Square
Cleveland 20

OREGON
Mr. John C. Robinson
2505 S. E. 11th Avenue
Portland

WASHINGTON
W. Ronald Benson, Inc.
820 First Avenue South
Seattle 4

Carbon Dispersions, Inc.

CALIFORNIA
E. S. Browning Co.
2321 Yates Ave.
Los Angeles 22
E. S. Browning Co.
1515 Third St.
San Francisco 7

COLORADO
E. C. Stone Co.
136 West 12th Ave.
Denver 4

FLORIDA
Palmer Supplies Co. of Fla.
P. O. Box 784
Orlando

ILLINOIS
Donald R. Fritzgerald
5875 N. Lincoln Ave.
Chicago 45

KENTUCKY
C. L. McGuire & Co.
137 St. Matthews Ave.
Louisville 7

LOUISIANA
Thompson-Hayward Chemical Co.
3111 Lowerline Ave.
New Orleans

MASSACHUSETTS
Lukens Chemical Co.
227 California St.
Newton 58

MISSOURI
Ack Sales Company
901 East 13th Ave.
North Kansas City 16

Thompson-Hayward Chemical Co.
5 Carr St.
St. Louis

NEW YORK
C. Withington Co.
47-40 5th Street
Long Island City 1

NEW YORK (Cont'd)
F. F. Salamon Co.
Castle Heights Ave.
Box 309
Nyack
Arthur Somers
11 Ormond Street
Rockville Centre

OHIO
The Paul Wiemer Co.
2089 Sherman Ave.
Cincinnati 12

PENNSYLVANIA
A. C. Hurlbrink
3701 N. Broad St.
Philadelphia
J. C. Ackerman Co.
Penn Lincoln Hotel
Pittsburgh 21

TEXAS
JaRo-Chem
P. O. Box 10544
Dallas 7

Celanese Corp. of America

GEORGIA
Osco Chemical Company
710 10th Street, N. W.
Atlanta

NEW JERSEY
Refined Products Corp.
624-644 Schuyler Avenue
Lyndhurst
Treplow Products, Inc.
59 Camden Street
Paterson

NORTH CAROLINA
Standard Chemical Products, Inc.
Sagaw Creek Road and Raleigh St.
Charlotte

OHIO
Wooster Finishes Corp.
Foot of Spruce Street
Wooster

OREGON
Great Western Chemical Co., Inc.
3720 N. W. Yeon Avenue
Portland 10

WASHINGTON
Great Western Chemical Co., Inc.
1242-6th Street, South
Seattle 4

CANADA
Canadian Chemical Co., Ltd.
1600 Dorchester Street West
Montreal 25, Quebec
Canadian Chemical Co., Ltd.
1819 Yonge Street
Toronto 7, Ontario
Canadian Chemical Co., Ltd.
800 Burrard Bldg.
1030 W. Georgia Street
Vancouver 5, B. C.

Chisholm-Ryder Company of Pennsylvania

CALIFORNIA
Watts King Company
3404 N. Figueroa Street
Los Angeles 65
Food Equipment & Supply Co.
210 Mississippi St.
San Francisco 7

COLORADO
E. F. DeLine Company
224 W. Alameda Avenue
Denver 9

GEORGIA
The Hoshall Company
1414 Morningside Dr., N. E.
Atlanta 6

ILLINOIS
Ward Equipment Sales
8109 S. Ashland Avenue
Chicago 20

MICHIGAN
G. R. Williams Sales
1619 Progress Street
Lincoln Park

MINNESOTA
S. Riekes & Sons
240-10 Avenue South
Minneapolis 15

NEW YORK
William B. Sanford, Inc.
601 West 26th Street
New York 1

TEXAS
Leon C. Osborn Co., Inc.
P. O. Box 1346
Harlingen

WASHINGTON
Duncan Equipment Company
506 Broadway
Seattle 22

WISCONSIN
Schroeder Mc-Key Company
2740 S. 32 Street
Milwaukee 46

CANADA
T. W. MacKay & Son Ltd.
1807 Fir Street
Vancouver, B. C.

Colloids, Inc.

CALIFORNIA
Naftone, Inc.
c/o John K. Bice Co.
440 Seaton Street
Los Angeles 13
Naftone, Inc.
c/o E. B. Taylor Company
442 Colyton Street
Los Angeles 13
Naftone, Inc.
383 Brannan Street
San Francisco 7

COLORADO
Naftone, Inc.
c/o L. H. Herr Company
Interstate Trust Bldg.
Denver 2

FLORIDA
A. J. Passonno Co.
2121 Gulf-to-Bay Blvd.
Clearwater
A. J. Passonno Co.
P. O. Box 623
Tampa

GEORGIA
A. J. Passonno Co.
187 Spring St., N. W.
Atlanta

ILLINOIS
J. W. Van Tuin Co.
5844 Lincoln Avenue
Chicago 45

KANSAS
Vulcan Sales Co.
5920 Nall
Mission

KENTUCKY
C. L. McGuire & Co.
137 St. Matthews Ave.
Louisville

MICHIGAN
F. C. Grosius
380 Hilton Road
Detroit 20

MINNESOTA
Hesco, Inc.
324-1st Street
Minneapolis 1

MISSOURI
Naftone, Inc.
c/o Harry A. Baumstark & Company
6801 Hoffman Avenue
St. Louis 9

NEW YORK
C. E. Schott Co.
555-77th Street
Brooklyn 9

NORTH CAROLINA
Colloids of Carolina, Inc.
1716 Ward Street
High Point

OHIO
Ducros & Co., Inc.
P. O. Box 3945
Shaker Heights 20

OREGON
Naftone, Inc.
c/o Van Waters & Rogers, Inc.
3950 N. W. Yeon Avenue
Portland 10

PENNSYLVANIA
H. J. Cranston Co.
P. O. Box 48A
Sewickley

TENNESSEE
Robt. F. Sheahan Co.
198 So. Main Street
Memphis 2

TEXAS
Naftone, Inc.
c/o Southwest Sales Co., Inc.
2400-2420 Coombs St.
P. O. Box 9275
Dallas
Naftone, Inc.
c/o The E. B. McCullough Co.
2301 Commerce Street
Houston

WASHINGTON
Naftone, Inc.
c/o Van Waters & Rogers, Inc.
4000 First Avenue
Seattle 4

Colton Chemical Company

LOUISIANA
Breffeilh & Sheahan
P. O. Box 13222
New Orleans 25

MARYLAND
A. B. Kohl Sales Co.
4615 Edmondson Avenue
Baltimore 29

MASSACHUSETTS
Morris A. Kimmel
4-Phillips Terrace
Swampscott

NEW YORK
Seaboard Chemical Corp.
198 Broadway
New York 38

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon St.
Portland 10

PENNSYLVANIA
Harry W. Gaffney
1510 Girard Trust Bldg.
Philadelphia 2

SOUTH CAROLINA
Moretex Chemical Products, Inc.
P. O. Box 2528
Spartanburg

TENNESSEE
Robert F. Sheahan Co.
Suite No. 728, M & M Building
198 S. Main St.
Memphis 3

TEXAS
Van Waters & Rogers, Inc.
P. O. Box 1891
10216 Denton Road
Dallas 9
Van Waters & Rogers, Inc.
5403 Kirby Drive
Houston

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue, South
Seattle 4

Columbian Carbon Company

CALIFORNIA
Martin, Hoyt & Milne
906 East 3rd Street
Los Angeles 13
Martin, Hoyt & Milne
Merchants Exchange Bldg.
San Francisco 4

COLORADO
Application Engineers, Inc.
100 East Jefferson
Englewood (Denver)

GEORGIA
Charles L. Burks & Co.
P. O. Box 54
Atlanta (East Point)

ILLINOIS
The Cary Co.
228 N. LaSalle St.
Chicago 1

KENTUCKY
Wm. B. Tabler Co.
P. O. Box 1254
Louisville 1

LOUISIANA
Roy T. Cucullu Company
4818 Lancelot Drive
New Orleans 22

MINNESOTA
Willard N. Swanson Co.
1015 N. 3rd St.
Minneapolis 1

MISSOURI
Abner Hood Chemical Co.
507-517 N. Montgall Ave.
Kansas City 20

J. E. Niehaus & Co.
3419-21 Gratiot St.
St. Louis 3

NORTH CAROLINA
Charles L. Burks & Co.
P. O. Box 1032
Black Mountain

OREGON
Martin, Hoyt & Milne
1501 Northwest Kearney
Portland 12

TEXAS
Roy A Ribelin Dist. Co.
209 N. Hawkins
Dallas 26

Roy A. Ribelin Dist. Co.
P. O. Box 21081
Houston 26

WASHINGTON
Martin, Hoyt & Milne
1016 First Ave. S.
Seattle 4

Coors Porcelain Company

CALIFORNIA
Melvin L. Jontz
710 Orange Grove Ave.
So. Pasadena

ILLINOIS
Carl A. Lechner Company
1515 W. Howard Street
Chicago 26

KENTUCKY
The Argus Company
305 Madrid Building
Louisville 2

LOUISIANA
Griffith-Mehaffey Co., Inc.
640 So. Front Street
New Orleans 12

MICHIGAN
Theo. F. Gehle Company
603 Fisher Building
Detroit 2

MISSOURI
Ack Sales Company
P. O. Box 31
Kansas City 41

Ivan T. Bauman Company
817 N. Second Street
St. Louis 2

NEW YORK
C. Withington Company
47-40 Fifth Street
Long Island City 1

OREGON
Fred E. Alsop Company
935 N. W. 12th Avenue
Portland 9

PENNSYLVANIA
Van Horn, Metz & Company, Inc.
241 E. Elm Street
Conshohocken
Joseph A. Burns & Sons
125 Harrison Avenue
Pittsburgh 2

WASHINGTON
D. B. Smith Company
1016 First Avenue South
Seattle 4

CANADA
Bowers Machine Company
5860 St. Lawrence Boulevard
Montreal 14, Quebec
Grove Processing Equipment, Ltd.
2010 W. Fourth Avenue
Vancouver 9, B. C.

Corn Products Sales Company

CALIFORNIA
Johnson, Carvell and Murphy
P. O. Box 75218
Sanford Station
Los Angeles 5

Johnson, Locke Mercantile Co.
64 Pine Street
San Francisco 11

HAWAII
Birk Brothers
P. O. Box 2784
Honolulu, T. H.

NEW YORK
C. J. Erwin Co.
536 Ellicott Square
Buffalo 3

OHIO
Mr. A. S. Brown
2000 W. Central Ave.
Toledo

Crosby Chemicals, Inc.

CALIFORNIA
W. M. Gillies, Inc.
6505 Wilshire Blvd.
Los Angeles 48
W. M. Gillies, Inc.
244 California Street
San Francisco 11

CONNECTICUT
W. M. Gillies, Inc.
322 Main Street
Stamford

GEORGIA
George E. Missbach & Co.
Henry Grady Building
Atlanta 3

ILLINOIS
Philip E. Calo Company, Inc.
333 North Michigan Avenue
Chicago

MASSACHUSETTS
The Truesdale Company
52 Cambridge Street
Allston

MICHIGAN
O'Connor Chemicals, Inc.
10586 Knodell Street
Detroit 13

MISSOURI
Harry A. Baumstark & Company
6801 Hoffman Avenue
St. Louis 9

OHIO
The Dayton Oil Company
P. O. Box 85, Station A
Dayton

OKLAHOMA
Rullman Bros.
P. O. Box 7031
Oklahoma City 12

OREGON
W. M. Gillies, Inc.
621 S. W. Morrison Street
Portland 5

TEXAS
The Carroll Company
1323 Wall Street
Dallas 2
Petro-Chem Solvents Corp.
P. O. Box 85
Galena Park

WEST VIRGINIA
Miller Paint Manufacturing Company
P. O. Box 1852
Huntington

CANADA
Turpentine & Rosin Products Corp.
1801-1805 St. Patrick Street
Montreal, Quebec

Turpentine & Rosin Products Corp.
17 River Street
Toronto, Ontario

Shanahan's Limited
P. O. Box 2015
Vancouver, B. C.

Crownoil Chemical Company

NEW YORK
D. H. Litter Co.
116 East 16 Street
New York

PENNSYLVANIA
George A. Rowley & Co.
937 North Front St.
Philadelphia

The Cuno Engineering Corp.

ALABAMA
George S. Edwards Company, Inc.
1920-28th Avenue, S.
Birmingham 9

COLORADO
Joy & Cox, Inc.
2124 Broadway
Denver 5

CONNECTICUT
Lewin & Sons, Inc.
310 E. Washington Avenue
Brideport 8
The Callahan Company
59 Hoadley Place
Hartford 1

CONNECTICUT (Cont'd)
The Page, Steele & Flagg Co.
30 Prout St.
New Haven
Charles A. Templeton, Inc.
Waterbury 20

FLORIDA
Control Equipment Company, Inc.
1760 Goodrich Avenue
Winter Park

GEORGIA
Control Equipment Company, Inc.
3166 Maple Drive, N. E.
Atlanta 5

GEORGIA (Cont'd)
Control Equipment Company, Inc.
P. O. Box 565
Washington

INDIANA
John Carlson Co.
4808 Broadway
Indianapolis 5

LOUISIANA
Eggelhof Engineers, Inc.
5131 Government St.
Baton Rouge
Eggelhof Engineers, Inc.
4524 Thalia St.
P. O. Box 13186
New Orleans 26
Eggelhof Engineers, Inc.
P. O. Box 4056
Shreveport

MASSACHUSETTS
O'Connell Supply
2 Norman Street
Everett
J. Russell & Company
359 Dwight St.
Holyoke 1

MICHIGAN
J. N. Fauver Company, Inc.
49 W. Hancock Avenue
Detroit 1

MISSOURI
Parker & Foster, Inc.
3519 Troost Avenue
Kansas City 9
Hagedorn & Gannon
4030 Chouteau Avenue
St. Louis 10

NEBRASKA
H. G. Klug Company
2029 North 67th Avenue
P. O. Box 1752
Omaha

NEW JERSEY
Process Equipment & Supply Co.
231 State Highway 17
Rutherford

NEW YORK
King & Shepherd, Inc.
50 Church St.
New York 7

OHIO
V. L. Towner Co.
4511 Brookpark Road
Cleveland 29

OKLAHOMA
Eggelhof Engineers, Inc.
1524 Hunt Building
Tulsa 3

OREGON
John H. Marvin Co., Inc.
6106 N. E. 18th Avenue
Portland 11

PENNSYLVANIA
George P. Dempler Company
1610 Potomac Avenue
Pittsburgh 16

RHODE ISLAND
Franklin Supply Company
945 Westminster St.
Providence

TENNESSEE
G. H. Avery Company
944 Rayner St.
Memphis 14

TEXAS
Eggelhof Engineers, Inc.
4331 Belmont Avenue
Dallas 4
Eggelhof Engineers, Inc.
1912 Hussion St.
P. O. Box 1743
Houston
Eggelhof Engineers, Inc.
18th & Avenue K
Lubbock
Eggelhof Engineers, Inc.
1502 N. Main Avenue
San Antonio 1

UTAH
C. H. Spencer and Company
210 W. 33rd South
P. O. Box 1054
Salt Lake City

WASHINGTON
John H. Marvin Co.
422 First Avenue, W.
Seattle 99

WEST VIRGINIA
Process Supply Co.
707 Ruffner Avenue
Charleston 1

CANADA
Peacock Bros., Ltd.
P. O. Box 1040
Montreal 3, Quebec

Dehydag

CALIFORNIA
The East Asiatic Co., Inc.
530 West 6th St.
Los Angeles 14
The East Asiatic Co., Inc.
465 California St.
San Francisco 4

ILLINOIS
A. H. Carnes Co.
75 East Wacker Drive
Chicago 1

LOUISIANA
Ben R. Hendrix Trading Co., Inc.
305 Marine Building
219 Carondelet Street
New Orleans 12

NEW YORK
Fallek Products Company, Inc.
165 Broadway
New York 6

NEW YORK (Cont'd)
The East Asiatic Co., Inc.
417 Equitable Building
421 S. W. Sixth Ave.
Portland 4

CANADA
Canerpa Limited
Suite 223
Drummond Building
1117 St. Catherine Street, W.
Montreal, Quebec

Canerpa Limited
Room 709
137 Wellington St., West
Toronto, Ontario

The East Asiatic Co., (P.Q.) Ltd.
Marine Building
Vancouver 1, B. C.

MEXICO
Mario Nepote
Justo Sierra 133
Guadalajara, Jal.
Tamm & Cia. S. A.
Isabel la Catolica 69
Mexico, D. F.

De Lore Division
National Lead Company

CALIFORNIA
A. J. Lynch & Co.
2424 Blanding Street
Alameda

A. J. Lynch & Co.
4560 East 50th St.
Los Angeles 58

COLORADO
L. H. Herr Company
16th & Lawrence Sts.
Denver 2

ILLINOIS
The Cary Co.
228 North LaSalle St.
Chicago 1

KENTUCKY
Wm. B. Tabler Co.
P. O. Box 1254
Louisville 1

LOUISIANA
Roy T. Cucullu Co.
4818 Lancelot Dr.
New Orleans 22

MASSACHUSETTS
T. H. Cushman Co.
84 Winchester St.
Newton Highlands 61

MICHIGAN
Baker & Collinson Co.
12000 Mt. Elliot Avenue
Detroit 12

MINNESOTA
Lyon Chemicals, Inc.
2305 Hampden Avenue
St. Paul 4

MISSOURI
Thompson-Hayward Chemica Co.
29th & Southwest Blvd.
Kansas City 8

NEW YORK
Columbian Carbon Co.
380 Madison Avenue
New York 17

OHIO
B. H. Roettker & Co.
3732 Lovell Ave., Cheviot
Cincinnati 11
Harshaw Chemical Co.
1945 E. 97 St.
Cleveland 6
National Lead Co.
659 Freeman Avenue
Cincinnati 3

PENNSYLVANIA
Dowdy Brothers
Wilford Building
N. E. Cor. 33rd & Arch Sts.
Philadelphia 4
National Lead Co.
P. O. Box 716
1376 River Avenue
Pittsburgh 12

TEXAS
Thompson-Hayward Chemical Co.
P. O. Box 6226
Dallas
Thompson-Hayward Chemical Co.
1701 Oliver Street, P. O. Box 4557
Houston 13

WASHINGTON
National Lead Co.
1128 W. Spokane Street
Seattle 4

CANADA
Canadian Titanium Pigments, Ltd.
630 Dorchester St. West
Montreal 2, Quebec
Canadian Titanium Pigments, Ltd.
Room 304, Terminal Bldg.
Foot of York St.
Toronto 1, Ontario
Canadian Titanium Pigments, Ltd.
1428 Granville St.
Vancouver, B. C.

Dewey and Almy Chemical Company

WASHINGTON
D. B. Smith Co.
1016 First Avenue, South
Seattle 4

CANADA
Drew Brown Limited
5410 Ferrier Street
Montreal 16, Quebec
Drew Brown Limited
50 Titan Road
Toronto 18, Ontario

Diamond Alkali Company

CANADA
Harrisons & Crosfield Ltd.
297 St. Paul Street, W.
Montreal, Quebec

MEXICO
Commercial Tropical, S. A.
Apartado Postal No. 1002
Mexico 1, D. F.

Diamonite Products Mfg. Company

CALIFORNIA
A. J. Lynch & Co.
4560 E. 50th Street
Los Angeles

COLORADO
George C. Brandt, Inc.
1940 Blake Street
Denver

FLORIDA
A. J. Passonno Company
107-22nd Street
Belleair Beach
Indian Rocks

ILLINOIS
Fred A. Jensen & Associates
510 North Dearborn Street
Chicago

KENTUCKY
M. J. Daly Company
38 Elm Street
Ludlow

MICHIGAN
George E. Moser & Son, Inc.
2961 Penobscot Building
Detroit

MINNESOTA
M. H. Baker Company
1645 Hennepin Avenue
Minneapolis

MISSOURI
Abner Hood Chemical Co.
507-517 N. Montgall Avenue
Kansas City
Harry G. Knapp
4918 Washington Blvd.
St. Louis

NEW YORK
Jesse S. Young Co., Inc.
2 Park Avenue
New York

OHIO
Ducros & Co., Inc.
3592 Lee Road
Shaker Heights 20

PENNSYLVANNIA
Chas. A. Wagner Co., Inc.
4455 North 6th Street
Philadelphia 40

WASHINGTON
Great Western Chemical
6921 E. Marginal Way
Seattle

The Eagle-Picher Company

GEORGIA
W. J. Baldridge
P. O. Box 96, Station A
Atlanta 10

J. S. & W. R. Eakins, Inc.

CALIFORNIA
A. J. Lynch & Co.
4560 E. 50th Street
Los Angeles 58
Cole & De Graf
656 Townsend Street
San Francisco 3

GEORGIA
George E. Missbach & Co.
Henry Grady Bldg.
Atlanta 3

ILLINOIS
James H. Furman Company
59 East Van Buren Street
Chicago 5

KENTUCKY
C. L. McGuire & Co.
900 Dumesnil St.
Louisville 3

LOUISIANA
Griffith-Mehaffey Co., Inc.
102 Poydras St.
New Orleans 12

MARYLAND
A. B. Kohl
4615 Edmondson Avenue
Baltimore 29

MASSACHUSETTS
R. T. Freeman Co.
Hingham Industrial Center
Boston

MICHIGAN
Northwest Sales, Inc.
16943 James Couzens Hwy.
Detroit 35

NEW YORK
James O. Meyers & Sons
290 Larkin Street
Buffalo 10

OHIO
Rice & Company
325 Bulkley Building
Cleveland 15

OREGON
Martin, Hoyt & Milne
1501 N. W. Kearney
Portland

PENNSYLVANIA
The O. Hommel Company
P. O. Box 475
Pittsburgh

WASHINGTON
Martin, Hoyt & Milne
10-16 First Ave., S.
Seattle

CANADA
Prescott & Company
2209 Hingston Avenue
Montreal, Quebec

MEXICO, D. F.
Comercial Tropical, S.A.
Calle de Elba No. 32-102/103

Eastman Chemical Products, Inc.

ARIZONA
Wilson Meyer Co.
111 Osborn Road West
Suite 213
Phoenix

CALIFORNIA
Wilson Meyer Co.
2060 South Garfield Avenue
Los Angeles 22

COLORADO
Wilson Meyer Co.
916 Broadway
Denver 3

OREGON
Wilson Meyer Co.
520 S. W. 6th Avenue
Portland 4

UTAH
Wilson Meyer Co.
73 South Main Street
Salt Lake City

WASHINGTON
Wilson Meyer Co.
318 Queen Anne Avenue
Seattle 9

Elgin Manufacturing Company

CALIFORNIA
The Watts King Co.
3404 N. Figueroa St.
Los Angeles 65
Food Equipment and Supply, Inc.
210 Mississippi St.
San Francisco 7
Food Machinery & Chemical Corp.
P. O. Box 760
San Jose 6

COLORADO
Halsell Brokerage Co.
3101 Walnut St.
Denver 5

GEORGIA
The Hoshall Company
1414 Morningside Dr., N.E.
Atlanta

ILLINOIS
Webster Equipment Co.
549 W. Randolph St.
Chicago 6
Universal Mercantile Co.
550 Cherokee Rd.
Highland Park

LOUISIANA
R. P. Anderson Co.
201 Bd. of Trade Annex
New Orleans

MASSACHUSETTS
William B. Sanford, Inc.
59 Carl St.
Newton Highlands

MICHIGAN
G. R. Williams
1619 Progress St.
Lincoln Park 25

MINNESOTA
Booth & Associates
1932 Drew Ave. So.
Minneapolis 16

MISSOURI
Martin O. Tiemann
1023 N. Grand Blvd.
St. Louis 6

NEW JERSEY
William B. Sanford, Inc.
115 N. Brookfield Road
Haddonfield

NEW YORK
William B. Sanford, Inc.
601 W. 26th St.
New York 1
American Steel Export
347 Madison Avenue
New York 17
Anglo-African Shipping Company of New York
16 E. 34th St.
New York
William B. Sanford, Inc.
82 St. Paul Street
Rochester 4

TEXAS
R. P. Anderson Co.
2503 W. Mockingbird Lane
Dallas 19
R. P. Anderson Co.
514 W. Main St.
Houston 6
H. T. Lawler & Sons
731-739 Perez
San Antonio

WASHINGTON
Duncan Equipment Co.
506 Broadway
Seattle 22

CANADA
Canners Machinery Ltd.
10850 Urbain St.
Montreal, Quebec
T. C. Fenton
Wellington at 3rd Ave.
Simcoe, Ontario
Canners Machinery Ltd.
Simcoe, Ontario
Thos. W. MacKay
1807 Fir St.
Vancouver 9, B. C.
Waller Sales Ltd.
454 King St.
West Toronto, Ontario

Emery Industries, Inc.

MICHIGAN
Ecclestone Chemical Co.
2673 Guoin Street
Detroit
Farnow, Inc.

The English Mica Company

ARKANSAS
Thompson-Hayward Chemical Co.
P. O. Box 413
North Little Rock

CALIFORNIA
C. P. Hall Company
1340 E. Sixth Street
Los Angeles 21
Paul W. Wood Company
350 Townsend Street
San Francisco 7

COLORADO
Thompson-Hayward Chemical Co.
1501 West 13th Avenue
Denver 4

FLORIDA
Palmer Supplies Co. of America
211 E. Robinson Avenue
Orlando

ILLINOIS
Kraft Chemical Company
917 West 18th Street
Chicago 8
Witco Chemical Co.
75 E. Wacker Drive
Chicago 1

IOWA
Thompson-Hayward Chemical Co.
S. W. 1st & Granger
Des Moines 15

KENTUCKY
The L. A. Miller Company
314 Republic Building
Louisville 2

MARYLAND
Technical Products, Inc.
114 E. York Street
Baltimore 30

MASSACHUSETTS
R. B. Huber
216 Tremont Street
Boston 16

MINNESOTA
M. H. Baker Co.
1645 Hennepin Avenue
Minneapolis 3

MISSOURI
Thompson-Hayward Chemical Co.
2915 Southwest Blvd.
Kansas City 8
Harry A. Baumstark & Co.
6801 Hoffman Avenue
St. Louis 9

NEW JERSEY
H. M. Royal, Inc.
689 Pennington Avenue
Trenton

NEW YORK
Witco Chemical Company
122 East 42nd Street
New York 17

OHIO
C. P. Hall Company
414-418 S. Broadway
Akron 8
Deeks & Company
6433 Wiehe Road
Cincinnati 13

OKLAHOMA
Thompson-Hayward Chemical Co.
36 North Guthrie Street
Tulsa 3

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon Avenue
Portland 10

PENNSYLVANIA
The O. Hommel Co.
209-13 Fourth Avenue
Pittsburgh

TENNESSEE
Thompson-Hayward Chemical Co.
463 North Main Street
Memphis

TEXAS
Van Waters & Rogers, Inc.
10216 Denton Road
Dallas 9
Thompson-Hayward Chemical Co.
1701 Oliver Street
Houston 13

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue S.
Seattle 4

CANADA
Frank E. Dempsey & Company
407 McGill Street
Montreal 28, Quebec
Frank E. Dempsey & Company
266 Parliament Street
Toronto 2, Ontario

Farnow, Inc.

CALIFORNIA
Carmona Chemical Company
1001 17th Street
San Francisco 17

NEW YORK
Jesse S. Young Co., Inc.
2 Park Avenue
New York 16

PENNSYLVANIA
John J. McCullion
2615 E. Westmoreland St.
Philadelphia 34

Fein's Tin Can Company, Inc.

FLORIDA
Smith Bottle & Supply Co.
Jacksonville
Magic City Bottle Supply
Miami

GEORGIA
Smith Can Company
Atlanta

MARYLAND
Gersh & Company
Baltimore

MASSACHUSETTS
Herbert B. Lewis Co.
Boston

MICHIGAN
George Horsfull & Co.
Detroit

OHIO
Continental Barrel & Drum
Cincinnati
Rice & Company
Cleveland
Columbus Drum & Barrel
Columbus

PENNSYLVANIA
Standard Can Corp.
Pittsburgh

Ferro Chemical Corporation

CALIFORNIA
Dorsett & Jackson
840 East 60th Street
Los Angeles 1
Ramco
95 Market Street
Oakland 7

COLORADO
George C. Brandt, Inc.
1940 Blake Street
Denver 2

GEORGIA
George E. Missbach Co.
Henry Grady Building
Atlanta 3

ILLINOIS
Daniel G. Hereley Co.
1607 Howard Street
Chicago 26

KANSAS
George C. Brandt, Inc.
3150 Fiberglas Rd.
Kansas City

KENTUCKY
Lewis & Company
102 W. Main Street
Louisville 2

LOUISIANA
Griffith-Mehaffey Co., Inc.
102 Peydras Street
New Orleans 12

MARYLAND
A. L. Webb & Sons, Inc.
1411-13 Fleet Street
Baltimore 31

MASSACHUSETTS
A. C. Nispel, Inc.
150 Causeway Street
Boston 14

MINNESOTA
George C. Brandt, Inc.
760 Vandalia Street
St. Paul W4

MISSOURI
Ivan T. Bauman Co.
817 N. Second St.
St. Louis 2

NEW YORK
James O. Meyers Sons
290 Larkin Street
Buffalo 10

OHIO
Fred W. Kamin
14820 Detroit Avenue
Cleveland

PENNSYLVANIA
Campbell Chemical Co.
1516 Oliver Building
Pittsburgh 22

O. L. West
50 E. Wynnewood Rd.
Room 202
Wynnewood

TEXAS
W. W. Richerson
2nd Unit-Sante Fe Bldg.
Dallas 2

Joe Coulson Company
2525 Cline Street
Houston 1

WISCONSIN
J. W. Copps, Inc.
P. O. Box 116, Sta. F.
333 W. Silver Springs Dr.
Milwaukee 9

CANADA
Allied Basic Chemicals, Ltd.
1100 Craig Street
Montreal 24, Quebec

Allied Basic Chemicals, Ltd.
35 Anderson Avenue
Toronto 12, Ontario

Sterling Fleischman Company

CALIFORNIA
A. J. Lynch & Co.
2424 Blanding Avenue
Alameda
The Lee Potter Co.
418-B N. Glendale Ave.
Glendale 6
Roll Rite Corp.
801 Jefferson St.
Oakland 7

CONNECTICUT
The S. L. Cooke Co.
P. O. Box 96
Banford

FLORIDA
James W. Grady Co.
915 W. Adams St.
Jacksonville

GEORGIA
Shepherd Equipment Co.
900 Walton Building
Atlanta 3
James E. Watson & Co.
P. O. Box 68
Marietta

ILLINOIS
K. Lightbourne & Assoc.
7117 W. Roosevelt Road
Berwyn

MASSACHUSETTS
Stanley Handling Equip. Co.
36 Ramah Circle
Agawam
G. C. McClellan & Co.
101 Tremont Street
Boston 8

MICHIGAN
Bockstanz Brothers
1205 Beaufait Avenue
Detroit 7

MISSOURI
Elmer E. Sharp & Associates
Box 8406
Kansas City 14
John J. Connell Co.
3014 Olive Street
St. Louis 5

NEW JERSEY
Peter I. Meyer
P. O. Box 554, Allwood Station
Clifton

NEW MEXICO
Gail Patrick Sales & Engr.
10214 Propps Dr. N. E.
Albuquerque

NEW YORK
J. E. Dumas & Co., Inc.
92 Central Avenue
Albany

NEW YORK (Cont'd)
Hohl Industrial Sales Co.
1540 Niagara Street
Buffalo 13
Richard S. Appleton, Inc.
P. O. Box 95
Jackson Heights 72
M. Neumunz & Son
90 West Street
New York 6
Insley-McEntee Equipment Co.
25 N. Washington Street
Rochester 14

NORTH CAROLINA
Blue Ridge Hardware & Supply Co.
P. O. Box 815
Lenoir

OHIO
E. J. Moriarty & Co.
8821 Kenwood Avenue
Cincinnati 42
Ohio Equipment Company
1658 St. Clair Avenue, N. E.
Cleveland 14
Eldon Sterling
320 N. Buckeye Street
Wooster

PENNSYLVANIA
Anderson Equipment Co.
P. O. Box 142
LaFayette Hill
Clayton DeNault
246 W. Upsal Street
Philadelphia 19
John G. Bryant Co.
101 E. Township Line Road
Upper Darby

TENNESSEE
Wursburg Brothers, Inc.
710-724 South Fourth Street
Memphis 2

VIRGINIA
Associated Sales Company
P. O. Box 1019
Richmond 9
S. L. Cooper Company
7300 Washington Highway
Richmond

WISCONSIN
John G. Steger & Assoc.
2318 N. 90th Street
Wauwatosa 13

CANADA
Prenco Progress & Engr. Corp.
72 Stafford Street
Toronto, Ontario

MEXICO
Importadora Y Distributadora
Calle Natias Romero #1011-2
Colonia Del Valle
Mexico 12, D. F.

Food Machinery and Chemical Corporation

CALIFORNIA
Evanstrom Co.
22 Battery Street
San Francisco 11

ILLINOIS
Central Solvents & Chemicals Co.
2540 West Flournoy St.
Chicago 12

INDIANA
Hoosier Solvents & Chemicals Corp.
Nelson Road East
Fort Wayne
Hoosier Solvents & Chemicals Corp.
1650 North Luett Avenue
Indianapolis 22

KENTUCKY
Dixie Solvents & Chemicals Co.
Dixie Highway at Appleton Lane
Louisville 16

LOUISIANA
Southern Solvents & Chemicals Co.
917 Jefferson Highway (Southport)
New Orleans 18

MASSACHUSETTS
Philipp Brothers Chemicals Inc.
10 High Street
Boston 10

MICHIGAN
Western Solvents & Chemicals Co.
6472 Selkirk Avenue
Detroit 11
Wolverine Solvents & Chem-Co.
2940 Stafford Avenue
Grand Rapids 8

MISSOURI
Missouri Solvents & Chemicals Corp.
2522 Nicholson Avenue
Kansas City 20

MISSOURI (Cont'd)
Missouri Solvents & Chemicals Corp.
419 De Soto Avenue
St. Louis 7

NEW JERSEY
Stoney-Mueller, Inc.
Page and Newark Avenues
Lyndhurst
Joseph Turner and Co.
(Inorganic Chemicals only)
Ridgefield

OHIO
Amsco Solvents & Chemicals Co.
4619 Reading Road
Cincinnati 29
Ohio Solvents & Chemicals Co.
3470 West 140th Street
Cleveland 11
Toledo Solvents & Chemical Co.
4051 South Avenue
Toledo 14

RHODE ISLAND
Philipp Brothers Chemicals, Inc.
511 Westminster Street
Providence

TEXAS
Texas Solvents & Chemicals Co.
2500 Vinson St.
Dallas 12
Texas Solvents & Chemicals Co.
8501 Market Street
Houston 15

WISCONSIN
Wisconsin Solvents & Chemicals Co.
1719 South 83rd St.
Milwaukee 14

CANADA
Canada Colors & Chemicals Ltd.
5165 Sherbrooke St., W.
Montreal, Quebec
Canada Colors & Chemicals Ltd.
1090 King Street West
Toronto 1, Ontario

Foremost Food and Chemical Company

ILLINOIS
M. B. Sweet Company
9100 South Park Avenue
Chicago 19

KANSAS
Vulcan Sales Company
5920 Nall
Mission

MASSACHUSETTS
N. S. Wilson & Sons
150 Causeway Street
Boston 14

MICHIGAN
Harry Holland & Sons, Inc.
10600 Puritan Avenue
Detroit 38

MINNESOTA
M. H. Baker Company
1645 Hennepin Avenue
Minneapolis 3

NEW YORK
H. Reisman Corporation
114 Liberty Street
New York 6

OHIO
Howard Dock
309 Ludlow Avenue
Cincinnati 20
F. W. Kamin Company
14820 Detroit Avenue
Lakewood 7

OKLAHOMA
Mr. Tom Rullman
P. O. Box 543
Oklahoma City 1

Freeman Chemical Corporation

FLORIDA
Palmer Supplies of Florida, Inc.
P. O. Box 784
Orlando

LOUISIANA
Roy T. Cucullu Co.
4818 Lancelot Drive
New Orleans 22

MICHIGAN
Matteson-Van Wey, Inc.
403 Baltimore Ave., West
Detroit 4

MINNESOTA
Hesco, Inc.
324 First St., North
Minneapolis

OHIO
Rice & Company
325 Bulkley Bldg.
Cleveland

PENNSYLVANIA
A. C. Hurlbrink
3701 North Broad St.
Philadelphia

TENNESSEE
Robert F. Sheahan & Co.
198 So. Main Street
Memphis 2

Georgia Kaolin Company

CALIFORNIA
Wharton Jackson Company
475 Huntington Drive
San Marino 9

COLORADO
Thompson-Hayward Chemical Company
1501 W. 13th Ave.
Denver 4

ILLINOIS
The Cary Company
228 North LaSalle St.
Chicago 1

IOWA
Thompson-Hayward Chemical Company
Box 176
Davenport
Thompson-Hayward Chemical Company
First St., S. W.
Des Moines 15

MASSACHUSETTS
The Truesdale Company
52 Cambridge St.
Allston 34
Chemicals & Pigments Corp.
227 California Street
Newton 58

MICHIGAN
Baker & Collinson
12000 Mt. Elliott
Detroit 12

MINNESOTA
Thompson-Hayward Chemical Company
909 Second St. South
Minneapolis 15

MISSOURI
Thompson-Hayward Chemical Company
2915 Southwest Blvd.
Kansas City 8
G. S. Robins & Company
126 Chouteau Avenue
St. Louis 2
Thompson-Hayward Chemical Company
5 Carr Street
St. Louis 2

NEW YORK
Commercial Chemicals, Inc.
211 Hertel Avenue
Buffalo 7
The Dyal Company
99 Hudson Street
New York 13
Hammill & Gillespie, Inc.
225 Broadway
New York 7

NEW YORK (Cont'd)
Whittaker, Clark & Daniels, Inc.
260 West Broadway
New York 13

OHIO
Palmer Supplies Company
2281 Scranton Road
Cleveland 13

OREGON
W. Ronald Benson, Inc.
2505 S. E. 11th Avenue
Portland 2

PENNSYLVANIA
Geo. A. Rowley & Company, Inc.
937 North Front Street
Philadelphia 23

TEXAS
Thompson-Hayward Chemical Company
Box 6226
Dallas 22
Thompson-Hayward Chemical Company
Box 4557
Houston

WASHINGTON
W. Ronald Benson, Inc.
820 First Avenue South
Seattle 4

CANADA
Harrisons & Crosfield Ltd.
215 Tenth Avenue West
Calgary, Alberta
Harrisons & Crosfield Ltd.
297 St. Paul Street, West
Montreal, Quebec
Harrisons & Crosfield Ltd.
Technical Division
240 Adelaide Street West
Toronto 1, Ontario
Harrisons & Crosfield Ltd.
137 Wellington St. West
Toronto 1, Ontario
Harrisons & Crosfield Ltd.
375 Terminal Avenue
Vancouver 4, B. C.
Harrisons & Crosfield Ltd.
1377 Winnipeg Avenue
Winnipeg, Manitoba

Georgia Marble Company

ALABAMA
A. Byron Couch, Jr.
105 Park Circle
Florence

CALIFORNIA
Pacific Coast Chemicals Co.
2060 Third Street
Berkeley 10
John K. Bice Company
440 Seaton Street
Los Angeles

COLORADO
George C. Brandt, Inc.
1940 Blake Street
Denver

FLORIDA
Ashton E. Garner Company
213 S. Myrtle Avenue
Clearwater

GEORGIA
R. T. Hopkins Company
544 Means Street, N. W.
Atlanta

ILLINOIS
Daniel G. Hereley Company
1607 Howard
Chicago 26

KANSAS
Morton-Myers Company
27 Southwest Blvd.
Kansas City

KENTUCKY
The L. A. Miller Company
512 Republic Building
Louisville

LOUISIANA
Griffith-Mehaffey Co., Inc.
640 S. Front Street
New Orleans

MASSACHUSETTS
Wyrough and Loser
751 Main Street
Waltham 54

MINNESOTA
George C. Brandt, Inc.
739 Pillsbury Avenue
St. Paul 14

MISSOURI
G. S. Robins & Company
126 Chouteau Avenue
St. Louis
Morton-Myers Co.
220 E. Missouri Avenue
Kansas City 6

NEW JERSEY
Wyrough and Loser
838 Broad St. Bank Bldg.
Trenton 8

NEW YORK
Smith Chemical & Color Co.
55 John Street
Brooklyn
Amkor Corp.
385 5th Avenue
New York 16

OHIO
Anderson & Company
547 Aqueduct Avenue
Akron
Deeks and Company
6433 Wiehe Road
Cincinnati
Norman G. Schabel Company
20950 Center Ridge Road
Cleveland 16

OREGON
W. Ronald Benson, Inc.
2505 S. E. 11th Avenue
Portland 2

PENNSYLVANIA
Joseph A. Burns
124 Harrison Avenue
Pittsburgh

SOUTH CAROLINA
A. B. Wood Company
644 E. Stone Avenue
Greenville

TENNESSEE
Chapman Chemical Company
60 North Third Street
Memphis

TEXAS
Southwest Sales Co., Inc.
P. O. Box 9275
Dallas
Joe Coulson Company
P. O. Box 14442
Houston

WASHINGTON
W. Ronald Benson, Inc.
820 First Avenue, South
Seattle 4

WISCONSIN
Harold T. Illing Company
4200 West Monarch Place
Milwaukee

CANADA
Frank E. Dempsey & Company
407 McGill Street
Montreal 28, Quebec
Frank E. Dempsey & Company
266 Parliament Street
Toronto 2, Ontario
Commercial Chemicals Division
Van Waters & Rogers (B.C.) Ltd.
2625 Skeena Street
Vancouver, B. C.

A. Gross & Company

CALIFORNIA
Braun Chemical Co.
Bakersfield
Braun Chemical Co.
1363 S. Bonnie Beach Place
Los Angeles 54
Braun-Knecht-Heimann Co.
1400 16th Street
San Francisco 19

GEORGIA
Triangle Chemical Co.
3182 Peachtree Road, NE
Atlanta 5

ILLINOIS
Carl A. Lechner Co.
1515 W. Howard St.
Chicago 26

IOWA
Thompson-Hayward Chemical Co.
S. W. First & Granger
Des Moines 15

KANSAS
Thompson-Hayward Chemical Co.
727 E. Osie Street
Wichita 2

LOUISIANA
Thompson-Hayward Chemical Co.
7700 Earhart Blvd.
New Orleans 18

MASSACHUSETTS
George Mann & Co., Inc.
105 Central St.
Stoneham 80

MICHIGAN
R. M. Stevenson Co.
18228 Mack Ave.
Detroit 36

MISSOURI
Thompson-Hayward Chemical Co.
29th St. & Southwest Blvd.
Kansas City 8
Thompson-Hayward Chemical Co.
5 Carr Street
St. Louis 2

NEBRASKA
Thompson-Hayward Chemical Co.
1110 S. 4th St.
Omaha 8

NEW YORK
James O. Meyers Sons
290 Larkin Street
Buffalo 10

OHIO
Harold C. Hall
Mariemont Hotel Bldg.
Cincinnati 27
Durcros & Company
3592 Lee Road
Shaker Heights 20

OKLAHOMA
Thompson-Hayward Chemical Co.
3909 So. Meridian Ave.
Oklahoma City 19
Thompson-Hayward Chemical Co.
36 N. Guthrie St.
Tulsa 3

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon St.
Portland 10

PENNSYLVANIA
Baker Industrial Oils Co.
18 W. Chelten Ave.
Philadelphia 44
J. C. Ackerman Company
Penn-Lincoln Hotel
Pittsburgh 21

RHODE ISLAND
George Mann & Co., Inc.
251 Fox Point Blvd.
Providence 3

TENNESSEE
Thompson-Hayward Chemical Co.
493 N. Front Street
Memphis 5

TEXAS
Thompson-Hayward Chemical Co.
2627 Weir Street
Dallas
Thompson-Hayward Chemical Co.
1701 Oliver Street
Houston 13

UTAH
Braun-Knecht-Heimann Co.
650 W. 8th South
Salt Lake City

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue South
Seattle 4

CANADA
Charles Albert Smith, Ltd.
8307 Royden Road
Montreal 6, Quebec
Charles Albert Smith, Ltd.
356 Eastern Avenue
Toronto, Ontario

MEXICO, D. F.
Drogas Y Productos Quimicos, S. A.
Paseo de la Reforma #76
Mexico 6

Harshaw Chemical Company

CALIFORNIA
A. J. Lynch & Co.
Alameda

GEORGIA
Deeks and Co.
Atlanta

INDIANA
August Hoffman and Co.
Indianapolis

IOWA
Dico Co.
Des Moines

KENTUCKY
The L. A. Miller Co.
Louisville

LOUISIANA
Barada and Page, Inc.
New Orleans

MARYLAND
William McGill
Baltimore

MASSACHUSETTS
The Truesdale Co.
Allston

MICHIGAN
The Wallgren Co.
Grand Rapids

MINNESOTA
Willard N. Swanson
Minneapolis

MISSOURI
Independent Oil Co.
St. Louis

OREGON
Great Western Chemical Co.
Portland

TENNESSEE
Peirson-Deakins Company
Chattanooga

WASHINGTON
Great Western Chemical Co.
Seattle

Hayden Mica Company, Inc.

CALIFORNIA
Pacific Coast Chemicals Co.
2060 Third Street
Berkeley 10
John K. Bice Co.
440 Seaton Street
Los Angeles 13

ILLINOIS
Harry Holland & Sons, Inc.
9 South Clinton Street
Chicago 6

MASSACHUSETTS
Ernest Jacoby & Co., Inc.
585 Boylston Street
Boston 16

NEW YORK
Superior Materials, Inc.
120 Liberty Street
New York 6

OHIO
Donald McKay Smith, Inc.
550 Hanna Building
Cleveland 15

OREGON
W. Ronald Benson, Inc.
2505 S. E. 11th Street
Portland

PENNSYLVANIA
J. C. Ackerman Company
Penn-Lincoln Hotel
Pittsburgh 21
Dowdy Bros.
33rd & Arch Street
Philadelphia 4

WASHINGTON
W. Ronald Benson, Inc.
820 First Avenue South
Seattle 4

CANADA
Prescott & Company, Reg'd.
2209 Hingston Avenue
Montreal 28, Quebec

Hercules Filter Corp.

CALIFORNIA
E. J. Brinkmeyer
136 No. Orlando Avenue
Los Angeles
C. V. Krause
41 Sacramento St.
San Francisco

FLORIDA
Thompson Equipment Co.
631 Rue Max
Pensacola

GEORGIA
Rittelmeyer & Co.
P. O. Box #1308
Atlanta

ILLINOIS
E. F. Daly
1037 Wisconsin Ave.
Oak Park

LOUISIANA
Thompson Equipment Co.
4020 Thalia Street
P. O. Box #13063
New Orleans

MISSOURI
Carel van Luin
153 Perthshire Rd.
Glascow Village
St. Louis 15

NEW JERSEY
George Zebora
P. O. Box #183
Little Falls

NEW YORK
C. H. Love
421 Chamber of Commerce Bldg.
Buffalo
VATco Engrg. Co.
150 Broadway
New York

OHIO
R. H. Keene
1900 Euclid Bldg.
Cleveland

TEXAS
Howard Hagood Co.
P. O. Box #175
Bellaire

Holland Color & Chemical Company

CALIFORNIA
W. M. Gillies, Inc.
Los Angeles
Ramco
Oakland

COLORADO
George C. Brandt, Inc.
Denver

GEORGIA
Triangle Chemical Co.
Atlanta

ILLINOIS
D. G. Hereley Co.
Chicago

KANSAS
George C. Brandt, Inc.
Kansas City

MARYLAND
Wm. McGill
Baltimore

MASSACHUSETTS
Herbert B. Lewis Co.
Boston

MICHIGAN
Matteson-Van Wey, Inc.
Detroit

MINNESOTA
George C. Brandt, Inc.
St. Paul

MISSOURI
H. A. Baumstark Co.
St. Louis

NEW YORK
G. A. Paine Co.
New York

OHIO
T. C. Kiesel
Cincinnati
A. C. Mueller Co.
Cleveland

PENNSYLVANIA
O. L. West Co.
Wynnewood

TENNESSEE
Robert F. Sheahan Co.
Memphis

WISCONSIN
J. W. Copps
Milwaukee

CANADA
Drew Brown, Ltd.
Montreal, Quebec
Drew Brown, Ltd.
Toronto, Ontario
Drew Brown, Ltd.
Vancouver, B. C.

MEXICO
Egon Meyer
Mexico, D.F.

Hope Machine Company

MASSACHUSETTS
The E. M. Noel Company
575 Boylston St.
Boston
L. A. Whitney Company, Inc.
50 Kearney Road
Needham
Economic Machinery Co.
Div. of Geo. J. Meyer Mfg. Co.
60 Fremont Street
Worcester

MISSOURI
Packaging Equipment, Inc.
2013 Olive Street
St. Louis

NEW YORK
Arthur J. Rocke Co.
431 Fifth Avenue
New York

CANADA
T. C. Fenton, Ltd.
42 James St. North
Hamilton, Ontario
Richardson Agencies, Ltd.
164 Bentworth St.
Toronto, Ontario

Interchemical Corporation

CALIFORNIA
A. J. Lynch & Company
2424 Blanding Street
Alameda
A. J. Lynch & Company
4560 East 50th Street
Los Angeles 58

OREGON
Great Western Chemical Company
2133 N. W. York Street
Portland 10

WASHINGTON
Great Western Chemical Company
6921 East Marginal Way
Seattle 8

International Engineering, Inc.

CALIFORNIA
G. M. Cooke Company
920 Grayson St.
Berkeley 10
Gene D. Pribble Co.
5416 E. Beverly Blvd.
Los Angeles 22

FLORIDA
James M. Evans
P. O. Box 1563
211-½ So. Tennessee Ave.
Lakeland

INDIANA
Gilbert C. Moore
540 E. 32 Street
Indianapolis 5

LOUISIANA
D. A. Warriner Instrument Sales & Service
7920 Zimple St.
New Orleans 18
Warren Engineering Sales Co.
P. O. Box 7
Westlake

MICHIGAN
DuBois-Webb Co.
19951 James Couzens Highway
P. O. Box 5217
Detroit 35
DuBois-Webb Co.
900 Monroe N. W.
Grand Rapids 2

MINNESOTA
Louis J. Baker
11908 Minnetonka Blvd.
Minneapolis

MISSOURI
Process Engrg. & Equipment
331 Thornton Ave.
St. Louis 19

NEW YORK
Forster-Johnston
1245 McKinley Parkway
P. O. Box 53 Lackawanna Branch
Buffalo 18
A. P. Weber
15 Park Row
New York 38

NORTH CAROLINA
Robt. S. Hudgins Co.
P. O. Box 6091
Charlotte 7

OHIO
Plant Equipment Company
P. O. Box 2625 Lakewood Branch
Cleveland 7

PENNSYLVANIA
D. N. Carlin Company
132 So. Whitfield St.
Pittsburgh 6

TENNESSEE
Craig Industrial Equip. Co.
P. O. Box 5776
1101 Poplar Ave.
Memphis 4

TEXAS
Datum Engineering Co.
P. O. Box 314
Bellaire

WISCONSIN
P. H. Lebzelter
P. O. Box 115
Menasha

Johns Manville Corp.

CANADA
Harrisons & Crosfield, Ltd.
215 10th Avenue W.
Calgary

Harrison & Crosfield, Ltd.
10229-105 Street
Edmonton

Harrisons & Crosfield, Ltd.
504 Glengarry Block
Saskatoon

Harrisons & Crosfield, Ltd.
375 Terminal Avenue
Vancouver

Harrisons & Crosfield, Ltd.
1377 Winnipeg Avenue
Winnipeg

Jones & Laughlin Steel Corp.

CALIFORNIA
A. J. Lynch & Company
2424 Blanding Street
Alameda
A. J. Lynch & Company
4560 East 50th Street
Los Angeles 58

FLORIDA
Palmer Supply Co. of Fla.
211 E. Robinson Ave.
Orlando

KENTUCKY
Lewis & Company of Ky.
102 W. Main Street
Louisville

NEBRASKA
S. Riekes & Sons
1402 Webster Street
Omaha

OKLAHOMA
Mr. W. E. Botz
P. O. Box 2140
Tulsa

OREGON
W. M. Gillies, Inc.
621 S. W. Morrison St.
Portland 5

SOUTH CAROLINA
Allison B. Wood Company
644 E. Stone Avenue
Greenville

WASHINGTON
Durkin Chemicals, Inc.
2603 Second Avenue
Seattle 1

Spencer Kellogg & Sons, Inc.

CALIFORNIA
Dorsett & Jackson, Inc.
840 East 60th St.
Los Angeles 1

Carmona Chemical Co.
1001-17th St.
San Francisco 7

COLORADO
L. H. Herr Co.
712 Interstate Trust Bldg.
Denver

GEORGIA
Charles L. Burks & Co.
P.O. Box 54
East Point

LOUISIANA
Lastrapes Bros.
322 Board of Trade Arcade
New Orleans 12

MISSOURI
Abner Hood Chemical Co.
507 N. Montgall St.
Kansas City 1

NEBRASKA
French Brokerage Co.
1402 Nicholas St.
Omaha 2

NORTH CAROLINA
Charles L. Burks & Co.
P.O. Box 1032
Black Mountain
Charles L. Burks & Co.
High Point Bonded Warehouse
P.O. Box 1666
High Point

OREGON
Great Western Chemical Co.
2133 N. W. York Ave.
Portland 10

PENNSYLVANIA
John D. Butts
926 Grant Bldg.
Pittsburgh 19

RHODE ISLAND
Sessions-Gifford Co., Inc.
255 Allen Ave.
Providence 1

TENNESSEE
Fred C. Cruze Co.
700 Empire Bldg.
Knoxville 2

Chapman Chemical Co.
P. O. Box 138
Memphis

TEXAS
JaRo-Chem
P. O. Box 10544
2551 Farrington St.
Dallas 7

Ed Kedy Co.
P. O. Box 305
2205 Nance St.
Houston 1

WASHINGTON
Great Western Chemical Co.
6921 E. Marginal Way
Seattle 8

Pearson & Smith, Inc.
W. 1133 College Ave.
Spokane 1

CANADA
Charles Albert Smith Ltd.
8307 Royden Rd.
Montreal 9, Quebec

Charles Albert Smith Ltd.
356 Eastern Ave.
Toronto 8, Ontario

C. M. Kemp Mfg. Company

ALABAMA
Andress-Mouat & Associates, Inc.
112 South 50th Street
Birmingham 12

ARIZONA
O. K. McCullough Company
1029 North 1st Street
Phoenix

CALIFORNIA
Lombard Smith Company
1007 Petroleum Bldg.
714 W. Olympic Blvd.
Los Angeles 15
E. A. Wilcox Company
277 Seventh Street
San Francisco 3

COLORADO
Blair Engineering Co.
4100 Grape Street
Denver 7

CONNECTICUT
W. J. Traxl & Associates
P. O. Box 84
West Hartford

DISTRICT OF COLUMBIA
Jobe & Company
Washington

FLORIDA
W. S. Bassett
507 Grove Avenue
Tampa 4

ILLINOIS
Genn & Logan Associates
7607 W. Addison Street
Chicago 34

MARYLAND
Jobe & Company
2857 Greenmount Avenue
Baltimore 18

MASSACHUSETTS
W. J. Traxl & Associates
80 Boylston Street
Boston

MICHIGAN
Messrs. Beltaire & Drissen
570 Livernois Avenue
Ferndale 20

MINNESOTA
Richardson-Sovde Co., Inc.
700 Fourth Street, South
Minneapolis 15

MISSOURI
Patton Equipment Co., Inc.
2333 South Hanley Road
St. Louis 17

NEW YORK
R. S. Brookman Associates
25 Anderson Road
Buffalo 25
Yocum & Goode, Inc.
2531 Graybar Bldg.
420 Lexington Avenue
New York 17

NEW YORK (Cont'd)
Mr. D. R. Whipple
6 Morris Avenue
Schenectady 8

NORTH CAROLINA
Messrs. McSpadden & Scantland
1524 South Boulevard
Charlotte 3

OHIO
Albert A. Azar & Associates
1987 Connecticut Avenue
Cincinnati 24

W. R. McDonough & Co., Inc.
508 Terminal Tower
Cleveland 13

OKLAHOMA
Vanco Engineering Company
4407 S. Peoria
Tulsa

PENNSYLVANIA
Robert Arnold Associates, Inc.
1530 Chestnut Street
Philadelphia 2

John R. Longenecker
222 Lytton Avenue
Pittsburgh 13

TEXAS
J. C. Riley Company
2419 South Boulevard
Houston 6

VIRGINIA
Jobe & Company
110 N. 8th Street
Richmond 19

WASHINGTON
E. A. Wilcox Company
915 Arctic Building
Seattle 4

CANADA
Williams & Wilson, Ltd.
544 Inspector Street
Montreal 3, Quebec

Williams & Wilson, Ltd.
71 Front Street, East
Toronto 1, Ontario

Kennedy Minerals Company, Inc.

COLORADO
Van Howe Ceramic Supply Co.
1248 South Broadway
Denver

ILLINOIS
Illini Ceramic Service, Inc.
439 North Wells Street
Chicago 10

NEW YORK
Charles B. Chrystal Company
53 Park Place
New York 7

OHIO
California Ceramic Supply
117409 Waterloo Road
Cleveland 10

TEXAS
Trinity Ceramic Supply Company
100 Howell Street
Dallas

Kentucky Color and Chemical Company

CALIFORNIA
John W. Dennin Co.
2048 Market Street
San Francisco

GEORGIA
R. T. Hopkins Co.
544 Means Street, N. W.
Atlanta 18

ILLINOIS
Edw. J. Lewis Co.
9 S. Clinton St.
Chicago 6

LOUISIANA
Lastrapes Brothers
322 Board of Trade Place
New Orleans 12

MASSACHUSETTS
A. C. Nispel, Inc.
150 Causeway St.
Boston

MICHIGAN
D. H. Osgood Co.
4181 Oakman Blvd.
Detroit

MINNESOTA
Horton-Earl Co.
324 North First St.
Minneapolis 1

MISSOURI
Morton-Myers Co.
201 E. Missouri Ave.
Kansas City

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon
Portland 10

PENNSYLVANIA
E. E. Zimmerman Co.
1704 Keenan Bldg.
Pittsburgh 22

TEXAS
The Roy A. Ribelin Dist. Co.
209 N. Hawkins
Dallas 26

The Roy A. Ribelin Dist. Co.
P.O. Box 21081
Houston

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Ave., So.
Seattle 4

WISCONSIN
R. L. Ferguson
229 E. Wisconsin Ave.
Milwaukee 2

CANADA
A. S. Paterson Co., Ltd.
2347 Yonge St.
Toronto 12, Ontario

MEXICO
Egon Meyer
Apartado No. 699
Lago Alberto no. 442-Desp. 6

Kinetic Dispersion Corporation

CALIFORNIA
A. J. Lynch & Company
2424 Blanding Street
Alameda
A. J. Lynch & Company
4560 E. 50th Street
Los Angeles 58

COLORADO
Thompson-Hayward Chem. Co.
1501 W. 13th Avenue
Denver 4

FLORIDA
Palmer Supplies Co. of Fla.
Palmer Building
209-211 E. Robinson Avenue
Orlando

ILLINOIS
Philip E. Calo Company
333 North Michigan Avenue
Chicago 1

KENTUCKY
C. L. McGuire & Company
137 St. Matthews Avenue
Louisville 7

LOUISIANA
Thompson-Hayward Chem. Co.
3111 Lowerline
P. O. Box 4068-Station F
New Orleans 18

MARYLAND
William McGill
237 President Street
Baltimore 2

MINNESOTA
Thompson-Hayward Chem. Co.
909 Second Street South
Minneapolis 16

MISSOURI
Thompson-Hayward Chem. Co.
2915 Southwest Boulevard
Kansas City 8
Thompson-Hayward Chem. Co.
No. 5 Carr Street
St. Louis 2

OHIO
Rice & Company
325 Bulkley Building
Cleveland 15

PENNSYLVANIA
The W. J. Grant Company
38 Maplewood Avenue
Philadelphia 44

TEXAS
Thompson-Hayward Chem. Co.
P. O. Box 6226
Dallas 1
Thompson-Hayward Chem. Co.
P. O. Box 4557
2600 Crockett
Houston 13
Thompson-Hayward Chem. Co.
P. O. Box 323
Lubbock
Thompson-Hayward Chem. Co.
P. O. Box 126-Grayson St. Station
222 Seguin
San Antonio 8

CANADA
Charles Tennant & Co., Ltd.
Room 440
6555 Cote Des Neiges Road
Montreal 26, Quebec

CANADA (Cont'd)
Charles Tennant & Co., Ltd.
1303 Yonge Street
Toronto 7, Ontario

McDanel Refractory Porcelain Company

CALIFORNIA
Fernholtz Machinery Co.
8468 Melrose Place
Los Angeles 46

C. O. Fiedler
2221 East 37th Street
Los Angeles 58

ILLINOIS
General Equipment
2635 W. Grand Avenue
Chicago 12

Huyck Construction Co.
1861 DeCook Avenue
Park Ridge

MICHIGAN
Epworth Manufacturing Co.
8809 Epworth Blvd.
Detroit 10

NEW JERSEY
Paul O. Abbe, Inc.
Little Falls

Lawler Company
Durham & L. V. R. R.
Metuchen

Crossley Machine Co.
E. State & Mammouth Sts.
Trenton 9

NEW YORK
Abbe Engineering Co.
544 Union Avenue
Brooklyn 11

OHIO
International Engineering, Inc.
Dayton 1

Birch Equipment & Machine Co.
East Liverpool

Economy Manufacturing Co.
East Liverpool
The Stevenson Company
Wellsville

PENNSYLVANIA
Ceramic Color & Chemical Mfg. Co.
New Brighton

J. P. Devine Mfg. Co.
49th & A. V. R. R.
Pittsburgh 1

Dravo Corp.
102 Fifth Avenue
Pittsburgh 22

Harding Company
240 Arch Street
York

McWhorter Chemicals, Inc.

ILLINOIS
Carl A. Lechner Company
1515 W. Howard Street
Chicago 26

MISSOURI
Ack Sales Company
901 E. 13th Street
No. Kansas City

OHIO
Dimlich-Radcliffe Company
13125 Shaker Square
Cleveland

WISCONSIN
J. W. Copps Company
Station F, Box 116
Milwaukee

Manton Gaulin Manufacturing Co., Inc.

ALABAMA
D. B. Gooch Associates, Inc.
5018 First Avenue, North
Birmingham 6

CALIFORNIA
E. M. Underwood & Co.
3319 Beverly Boulevard
Los Angeles 4
E. M. Underwood & Co.
1022 Taraval Street
San Francisco 16

COLORADO
Alldredge & McCabe
847 East 17th Avenue
Denver 18

CONNECTICUT
Ellinger and Ober
Mt. Carmel P. O. Box 56
2464 Whitney Avenue
New Haven 18

FLORIDA
Johnson Roney II & Associates Associates
P. O. Box 26
Clearwater

ILLINOIS
Fuente and Webster, Inc.
549 West Randolph Street
Chicago 6

INDIANA
Avels Sales & Engineering Co.
1728 West 16th Street
Indianapolis

MICHIGAN
H. A. Reed Company
19465 James Couzens Highway
Detroit 35

MINNESOTA
George R. Mellema Company
620 Plymouth Building
Minneapolis 3

MISSOURI
Wharton L. Peters Machinery Company
3863 West Pine Boulevard
St. Louis 8

NEW JERSEY
Frederick E. Herstein & Associates
Benninger Building
1429 Route 22
Mountainside

NEW YORK
Forster-Johnston Company
1245 McKinley Parkway
P. O. Box 53, Lackawanna Branch
Buffalo 18

NEW YORK (Cont'd)
Kenneth S. Valentine, Inc.
112 West 81st Street
New York 24

OHIO
White Industrial Sales & Equipment Company
919 Second National Building
Akron 8
White Industrial Sales & Equipment Company
140 West Sixth Street
Cincinnati 2
White Industrial Sales & Equipment Company
227 Hanna Building
Cleveland 15

OKLAHOMA
Edward Soph Company
202 East 18th Street
Tulsa

PENNSYLVANIA
R. W. Fox Company
P. O. Box 196
Newton Square
White Industrial Sales & Equipment Company
1312 Farmers Bank Building
Pittsburgh 22

SOUTH CAROLINA
The Textile Shops
Spartanburg

TEXAS
Edward Soph Company
768A M & M Building
Houston 2

WEST VIRGINIA
White Industrial Sales & Equipment Company
1033 Quarrier Building
Charleston 1

CANADA
Richardson Agencies, Ltd.
640 Laurentian Blvd., Suite 4
Montreal 9, Quebec
Richardson Agencies, Ltd.
Rear 18 Holly Street
Toronto, Ontario
Harvey Carruthers
9 East Broadway
Vancouver 10, B. C.

Marbon Chemical Company Div. of Borg-Warner

CALIFORNIA
Harwick Standard Chemical Co.
1248 Wholesale St.
Los Angeles 21

NEW YORK
British Anchor Chemical Co.
366 Madison Avenue
New York 17

CANADA
Bruce K. Macintyre
410 St. Nicholas St.
Montreal 1, Quebec

Dillions Chemical Co., Ltd.
137 Wellington St. West
Toronto, Ontario

Matherson-Selig Co.

CALIFORNIA
Sheldon T. Dahl
816 West Fifth St.
Los Angeles 17
Sheldon T. Dahl
210 California Street
San Francisco 11

MINNESOTA
Fred Olson
3744 Regent North
Robbinsdale 22

Merck & Company, Inc.

CALIFORNIA
The C. P. Hall Co. of Calif.
1340 E. Sixth Street
Los Angeles 21

ILLINOIS
The C. P. Hall Co. of Ill.
5245 West 73rd St.
Chicago 38

Harry Holland & Son, Inc.
9 South Clinton St.
Chicago 6

MICHIGAN
Harry Holland & Son, Inc.
10600 Puritan
Detroit 38

MISSOURI
G. S. Robins & Company
126 Chouteau Ave.
St. Louis 2

NEW JERSEY
The C. P. Hall Co. of N. J.
Wheeler Point Road
Newark

NEW YORK
Whittaker, Clark & Daniels, Inc.
100 Church St.
New York 7

OHIO
The C. P. Hall Co. of Ohio
414 South Broadway
Akron 8

OHIO
Palmer Supplies Co.
Times Star Bldg.
800 Broadway
Cincinnati 2

PENNSYLVANIA
R. Peltz Co.
218 Wilford Bldg.
33rd & Arch St.
Philadelphia

TENNESSEE
L. E. Offutt & Co.
P.O. Box 8063
431 N. Dunlap Street
Memphis 4

CANADA
Dalex Co., Ltd.
6834 Second Ave.
Rosemount, Montreal

Dalex Co., Ltd.
100 Floral Parkway
Toronto 15, Ontario

Metalsalts Corporation

CALIFORNIA
A. J. Lynch & Company
2424 Blanding Avenue
Alameda

A. J. Lynch & Company
4560 East 50th Street
Los Angeles 58

ILLINOIS
Philip E. Calo Company
333 North Michigan Ave.
Chicago 1

MASSACHUSETTS
Wyrough & Loser
751 Main Street
Waltham 54

MINNESOTA
Philip E. Calo Company
6518 Walker St.
Minneapolis 26

NEW JERSEY
Wyrough & Loser
838 Broad St., Bank Bldg.
Trenton 8

NEW YORK
Robert K. Pistell
107 Huxley Dr.
Snyder 21
Buffalo

Superior Materials, Inc.
120 Liberty St.
New York 6

OREGON
Cordano Chemical Co.
56 S. E. Belmont
Portland 14

PENNSYLVANIA
Harwood J. Cranston
R. D. #2, Box 48A
Sewickley

SOUTH CAROLINA
Allison B. Wood Company
644 East Stone Ave.
Greenville

WASHINGTON
Corl Chemical Company
2603 Second Avenue
Seattle 1

CANADA
Natural Products Corp.
738 Marin Avenue
Montreal, Quebec

Metals Disintegrating Company, Inc.

CALIFORNIA
E. M. Walls Co.
353 Sacramento Street
San Francisco 11
American Mineral Spirits Co., Western
8600 South Garfield Avenue
South Gate

COLORADO
George C. Brandt, Inc.
1920 Market Street
Denver 2

GEORGIA
R. T. Hopkins Co.
544 Means Street, N. W.
Atlanta
Charles L. Burks & Co.
P. O. Box 54
East Point

ILLINOIS
Daniel G. Hereley Co.
1607 W. Howard Street
Chicago

KANSAS
George C. Brandt, Inc.
3150 Fiberglas Road
Kansas City 15

KENTUCKY
Lewis & Co. of Kentucky, Inc.
102 W. Main Street
Louisville 2

LOUISIANA
Breffeilh & Sheahan Co.
P. O. Box 13222
New Orleans 25

MASSACHUSETTS
The Truesdale Co.
52 Cambridge Street
Allston 34

MICHIGAN
Quigley & Milke
16134 E. Warren Avenue
Detroit 24

MINNESOTA
George C. Brandt, Inc.
739 Pillsbury Avenue
St. Paul 14

MISSOURI
J. E. Niehaus & Co., Inc.
3419-21 Gratiot Street
St. Louis 3

NEW JERSEY
American Mineral Spirits Co.
Mountain Avenue
Murray Hill

NEW YORK
American Weldrock Corp.
354 Elm Street
Buffalo

NORTH CAROLINA
Charles L. Burks & Co.
P. O. Box 1032
Black Mountain,
Charles L. Burks & Co.
High Point Bonded Warehouse
419 S. Hamilton Street
High Point
OHIO
A. C. Mueller Co., Inc.
616 St. Clair Avenue, N. E.
Cleveland 14
The Paul Wiemer Co.
2089 Sherman Avenue
Norwood 12

OREGON
Cordano Chemical Co.
56 S. E. Belmont Street
Portland 14

PENNSYLVANIA
Campbell Chemical Co.
P. O. Box 486
Carnegie
American Mineral Spirits Co.
Colwells Lane (P. O. Box 348)
Conshohocken

TENNESSEE
Robert F. Sheahan Co.
P. O. Box 2654
Memphis

TEXAS
W. W. Richerson Co.
712 Unit 2 Santa Fe Building
Dallas
Roy A. Ribelin Distributing Co.
570-A M & M Building
Houston 2

WASHINGTON
D. B. Smith Co.
1016 First Avenue, South
Seattle 4

WISCONSIN
J. W. Copps, Inc.
P. O. Box 116, Station F
Milwaukee

Mineral & Chemicals Corp. of America

CALIFORNIA
E. M. Walls Company
353 Sacramento Street
San Francisco 11

Chemical-Additives Company
3155 Leonis Blvd.
Vernon 58

COLORADO
George C. Brandt, Inc.
1920 Market Street
Denver 2

FLORIDA
C. Withington, Inc.
1641 Landon Avenue
Jacksonville

GEORGIA
Southern States Chemical Co.
1061 W. Marietta Street, N. W.
Atlanta

ILLINOIS
Commerce Petroleum Co.
2980 Archer Avenue
Chicago 8

KANSAS
George C. Brandt, Inc.
3150 Fiberglas Road
Kansas City

KENTUCKY
Wm. B. Tabler Company
P.O. Box 1254
Louisville

LOUISIANA
Barada & Page, Inc.
Maple & Leake Avenues
New Orleans 18

MASSACHUSETTS
T. C. Ashley Company
683 Atlantic Avenue
Boston 11

MICHIGAN
A. E. Fleming Company
1900 E. Jefferson Avenue
Detroit 7

MINNESOTA
George C. Brandt, Inc.
739 Pillsbury Avenue
St. Paul 14

MISSOURI
Barada & Page, Inc.
Ft. of Destrehan Street
St. Louis 7

NEW YORK
James O. Meyers Sons
290 Larkin Street
Buffalo 10

NEW YORK (Cont'd)

Superior Materials, Inc.
120 Liberty Street
New York 6

NORTH CAROLINA
Southern States Chemical Co.
1039 Bond Street
Charlotte

OHIO
C. L. Zimmerman Company
Cincinnati Union Terminal
Cincinnati 3
A. C. Mueller Company, Inc.
616 St. Clair Ave., N. E.
Cleveland 14

OKLAHOMA
Barada & Page, Inc.
1700 West Grand Avenue
Oklahoma City

Barada & Page, Inc.
26 North Guthrie St.
Tulsa 3

OREGON
Cordano Chemical Co.
56 Southeast Belmont St.
Portland 1

PENNSYLVANIA
Van Horn, Metz & Co., Inc.
241 E. Elm St.
Conshohocken

J. C. Ackerman Co.
789 Penn Avenue
Pittsburgh 21

SOUTH CAROLINA
Southern States Chemical Co.
25 Peden St.
Greenville

TEXAS
Barada & Page, Inc.
3306 Borich St.
Dallas 10

Barada & Page, Inc.
Kirbyville & Murphy Sts.
Houston 21

WASHINGTON
D. B. Smith Company
1016 First Ave., So.
Seattle 4

WISCONSIN
Commerce Industrial Chemicals, Inc.
6377 N. Tutonia Avenue
Milwaukee 9

CANADA
Mackenzie & Feimann Ltd.
845 E. Hastings St.
Vancouver 4, B. C.

Drew, Brown Ltd.
5410 Ferrier St.
Montreal 9, Quebec

Drew, Brown Ltd.
50 Titan Road
Toronto 18, Ontario

MEXICO
Watson, Phillips
y Cia., Sucs., S. A.
Apartado Postal #67
Mexico City 6, D. F.

Mineral Pigments Corp.

ALABAMA
Mr. A. B. Couch
827 West Alabama Street
Florence

CALIFORNIA
E. M. Walls Company
353 Sacramento Street
San Francisco 11

FLORIDA
Palmer Supplies Co. of Fla.
211 E. Robinson Avenue
Orlando

LOUISIANA
Thompson-Hayward Chemical Co.
3111 Lowerline Street
New Orleans 18

MASSACHUSETTS
J. M. Washburn Company
Box 121
Arlington 74

MICHIGAN
Skelton Chemical Company
Marygrove Bldg.
8830 West McNichols Rd.
Detroit 21
Krekel-Goetz Sales & Supply Co.
302 Houseman Bldg.
Grand Rapids 2

MINNESOTA
Thompson-Hayward Chemical Co.
909 Second Street South
Minneapolis 16

MISSOURI
Ivan T. Bauman Company
817 North Second Street
St. Louis 2

NEW YORK
Dean Material & Supply Corp.
P.O. Box 97
University Station
Syracuse 10

OHIO
S. S. Skelton Company
104 Lepper Road
Akron

S. S. Skelton Company
2775 S. Moreland Blvd., S.E.
Cleveland 20

OREGON
W. M. Gillies Inc.
621 S. W. Morrison St.
Portland 5

PENNSYLVANIA
Campbell Chemical Co.
40 East Main Street
Carnegie
Van Horn, Metz & Co., Inc.
214 East Elm Street
Conshohocken

TEXAS
Mr. M. H. Cron
c/o Joe Coulson Co.
P.O. Box 14442
Houston

WASHINGTON
Durkin Chemicals, Inc.
2603 Second Avenue
Seattle 1

CANADA
Pigment & Chemical Co., Ltd.
6333 Decarrie Blvd.
Montreal 29

Pigment & Chemical Co., Ltd.
137 Wellington St., West
Toronto, Ontario

Mona Industries, Inc.

CALIFORNIA
Martin, Hoyt & Milne
906 East Third Street
Los Angeles

Martin, Hoyt & Milne
Merchants Exchange Bldg.
San Francisco

DELAWARE
H. D. Thornley Co.
901 Liftwood Road
Wilmington 3

NEW YORK
Ritter Chemical Co., Inc.
Amsterdam

WASHINGTON
Martin, Hoyt & Milne
1016 First Avenue So.
Seattle

Mooney Machine Mfg. Company

CALIFORNIA
Moore Dry Dock Company
Foot of Adeline Street
Oakland 23

OREGON
Cordano Chemical Company
56 Southeast Belmont Street
Portland 14

WASHINGTON
D. B. Smith Company
1016 First Avenue South
Seattle 4

CANADA
T. F. Holdsworth & Company
1613 Yew Street
Vancouver, B. C.

Naftone, Inc.

CALIFORNIA
John K. Bice Co.
440 Seaton Street
Los Angeles 13
E. B. Taylor Company
442 Colyton Street
Los Angeles 13

COLORADO
L. H. Herr Company
Interstate Trust Building
Denver 2

FLORIDA
Palmer Supplies Company
211 East Robinson Avenue
Orlando

GEORGIA
Charles E. Baker, Inc.
1158 Avon Avenue, S.W.
Atlanta

ILLINOIS
Donald R. Fitzgerald Co.
5875 N. Lincoln Avenue
Chicago 45

KENTUCKY
C. L. McGuire and Co.
137 St. Matthews Avenue
Louisville 7

LOUISIANA
Breffeilh and Sheahan Company
P. O. Box 13222
New Orleans 25

MARYLAND
The Warner-Graham Co.
President & Fawn Sts.
Baltimore

MASSACHUSETTS
R. B. Huber, Sales Engineer
216 Tremont Street
Boston 16

MICHIGAN
Theo. F. Gehle Co.
603 Fisher Building
Detroit 2

MINNESOTA
Hawkins Chemical, Inc.
3100 E. Hennepin Avenue
Minneapolis 13

MISSOURI
Ack Sales Company
901 E. 13th Avenue
North Kansas City 16
Harry A. Baumstark & Company
6801 Hoffman Avenue
St. Louis 9

NEW YORK
John H. Calo Co., Inc.
19 Rector Street
New York 6

OHIO
Deeks & Co.
6433 Wiehe Road, Golf Manor
Cincinnati 13
Norman G. Schabel Co.
20950 Center Ridge Road
Cleveland 16

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon Avenue
Portland

PENNSYLVANIA
John J. McCullion
2615 East Westmoreland Street
Philadelphia 34
J. C. Ackerman Co.
Penn-Lincoln Hotel
Pittsburgh 21

TENNESSEE
Robert F. Sheahan Company
M & M Building—Room 728
P. O. Box 2654
198 South Main Street
Memphis

TEXAS
Southwest Sales Co., Inc.
2400-2420 Coombs Street
Dallas
The E. B. McCullough Co.
2301 Commerce Street
Houston

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue
Seattle 4

Naugatuck Chemical Company

CALIFORNIA
L. H. Butcher Co.
3628 East Olympic Blvd.
Los Angeles 23

CONNECTICUT
Mr. Robert E. Tigner
Verona Drive
Riverside

ILLINOIS
D. G. Hereley & Co., Inc.
1607 Harvard St.
Chicago 26

OHIO
S. S. Skelton Company
2775 S. Moreland Blvd.
Cleveland 20

CANADA
Dominion Rubber Co., Ltd.
Latex & Reclaim Div.
P.O. Box 130—Place D'Armes
Montreal, Quebec

MEXICO
U. S. Rubber International
1230 Avenue of the Americas
New York, New York

Neville Chemical Company

CALIFORNIA
Paul W. Wood Company
2600 South Eastern Avenue
Los Angeles 22
Paul W. Wood Company
350 Townsend Street
San Francisco 7

GEORGIA
George E. Missbach & Co.
Henry Grady Bldg.
Atlanta 3

ILLINOIS
Donald R. Fitzgerald
5875 N. Lincoln Avenue
Chicago 45

MASSACHUSETTS
T. C. Ashley & Co.
683 Atlantic Avenue
Boston 11

MICHIGAN
O'Connor Chemicals, Inc.
10586 Knodell Street
Detroit 13

MICHIGAN (Cont'd)

Krekel-Goetz Sales & Supply
302 Houseman Bldg.
Grand Rapids 2

MINNESOTA
P. E. Calo Company
6518 Walker Street
Minneapolis 26

MISSOURI
Morton-Myers Company
Southwest Blvd. & State Line
Kansas City 8
Clifford L. Iorns Co.
216 S. 7th Street
St. Louis 2

NEW YORK
Commercial Chemicals, Inc.
211 Hertel Avenue
Buffalo 7
John H. Calo Company
19 Rector Street
New York 6

OHIO
Harold C. Hall
Mariemont Hotel Bldg.
Cincinnati 27
Ducros & Company
2860 E. 130th Street
Cleveland 20

PENNSYLVANIA
George Senn, Inc.
2200 E. Westmoreland Ave.
Philadelphia 34

TEXAS
W. W. Richerson Co.
712 Unit 2, Sante Fe Bldg.
Dallas 2
E. B. McCullough Co.
2301 Commerce Street
Houston 2

WISCONSIN
Donald R. Fitzerald
Chicago 45, Ill.

CANADA
Bate Chemical Corp., Ltd.
5165 Sherbrooke St., West
Montreal 28, Quebec
Canadian Mineral Spirits Co., Ltd.
38-40 Industrial St.
Toronto 17, Ont.

MEXICO
Commercial Tropical, S. A.
No. 60 Calle de Praga
3° y 4° Pisos
Mexico D. F.

The New Jersey Zinc Company

OREGON
Van Waters & Rogers
3950 N. W. Yeon Avenue
Portland 10

TEXAS
Van Waters & Rogers
10216 Denton Road
Dallas 1
Van Waters & Rogers
5403 Kirby Drive
Houston 5

WASHINGTON
Van Waters & Rogers
4000 First Avenue South
Seattle 4

WASHINGTON (Cont'd)

Van Waters & Rogers
North 809 Washington St.
Spokane 1

CANADA
St. Lawrence Chemical Co.
5405 Pare Street
Montreal 16, Quebec
St. Lawrence Chemical Co.
47 Gurney Crescent
Toronto 10, Ontario
Van Waters & Rogers
650 Industrial Avenue
Vancouver 4, B. C.

Newport Industries Company

ALABAMA
Hulsey Brokerage Co.
115 South 35th Street
Birmingham

CALIFORNIA
S. L. Abbot Co.
4255 District Blvd.
Los Angeles 21
S. L. Abbot Co.
135 King Street
San Francisco

COLORADO
George C. Brandt, Inc.
1940 Blake Street
Denver 2

GEORGIA
Southern States Chemical Co.
1061 W. Marietta St., N. W.
Atlanta 18

INDIANA
The August Hoffman Co.
P. O. Box 41115
Indianapolis 41

KANSAS
George C. Brandt, Inc.
3150 Fibreglas Road
Kansas City 15

KENTUCKY
Lewis & Company
102 West Main Street
Louisville

MARYLAND
The Warner-Graham Co.
President & Fawn Sts.
Baltimore 2

MASSACHUSETTS
Mulcahy & Griffin, Inc.
141 Milk Street
Boston 9

MICHIGAN
Baker & Collinson
12000 Mt. Elliott Avenue
Detroit 12

MINNESOTA
George C. Brandt, Inc.
3419 Pillsbury Avenue
St. Paul

MISSOURI
J. E. Niehaus & Co., Inc.
3419 Gratiot Street
St. Louis 3

NEW YORK
Ritter Chemical Company
Amsterdam
James O. Meyers Sons
290 Larkin Street
Buffalo 10

NORTH CAROLINA
F. H. Ross Company
1649 W. Morehead Street
Charlotte
F. H. Ross Company
2802 Patterson Avenue
Greensboro

OHIO
J. H. Hinz Company
405 Rockefeller Bldg.
Cleveland 13

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon Avenue
Portland 10

PENNSYLVANIA
John D. Butts
Grant Building
Pittsburgh 19

TENNESSEE
Post Brokerage Company
814-10th Avenue North
Nashville

TEXAS
Roy A. Ribelin Dist. Co.
209 North Hawkins
Dallas 26
Roy A. Ribelin Dist. Co.
570-A M & M Building
Houston

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue, South
Seattle 4

WEST VIRGINIA
K. F. Brockell
c/o Williamson Paint Co.
Charleston

CANADA
Drew Brown, Ltd.
5410 Ferrier Street
Montreal 9, Quebec
Drew Brown, Ltd.
50 Titan Road
Toronto 18, Ontario

Norcross Corporation

CALIFORNIA
Jensen Instrument Co.
1919 Beverly Boulevard
Los Angeles 57
Jensen Instrument Co.
429 Bryant Street
San Francisco 7

ILLINOIS
J. B. McMahon
332 South Michigan Ave.
Chicago 4

LOUISIANA
Marshall, Neil & Pauley, Inc.
P. O. Box 13276
New Orleans

MICHIGAN
King Sales Corporation
12638 Woodrow Wilson Avenue
Detroit

NEW YORK
Murphy & Morse
P. O. Box 26
Kenmore, Buffalo 17

OHIO
Wilcox Engineering Co.
P. O. Box 16
Cincinnati 12
King Instrument Co.
P. O. Box 7283
Cleveland 29

OKLAHOMA
Arduser & Company
P. O. Box 4267
Tulsa

PENNSYLVANIA
King Instrument Co.
P. O. Box 10387
Pittsburgh

TEXAS
Marshall, Neil & Pauley, Inc.
3513 West Dallas Avenue
Houston 19

WISCONSIN
Pyro-Matic Industrials
500 W. National Avenue
Milwaukee

CANADA
W. J. Westaway Co., Ltd.
Main & MacNab Streets
Hamilton, Ontario
W. J. Westaway Co., Ltd.
7335 St. Lawrence Blvd.
Montreal, Quebec

Nuodex Products Company

ARKANSAS
Thompson-Hayward Chemical Co.
P.O. Box 85, Asher Ave. Station
3100 W. 65th Street
Little Rock

CALIFORNIA
Cole & De Graf
656 Townsend Street
San Francisco 3

COLORADO
Thompson-Hayward Chemical Co.
1501 West 13th Street
Denver 2

GEORGIA
R. T. Hopkins Company
544 Means Street, N. W.
Atlanta 18

ILLINOIS
J. W. Van Tuin Company
5844 No. Lincoln Avenue
Chicago 45

INDIANA
Indiana Naval Stores Co.
P.O. Box 791
401-09 West 17th Street
Indianapolis

IOWA
Thompson-Hayward Chemical Co.
P.O. Box 176
802 Fishertown Road
Davenport
Thompson-Hayward Chemical Co.
Southwest First and Granger
Des Moines 15

KANSAS
Thompson-Hayward Chemical Co.
727 East Osie Street, Box 2897
South Wichita Station
Wichita 2

KENTUCKY
The Argus Company, Inc.
305 Madrid Building
Louisville 2

LOUISIANA
Thompson-Hayward Chemical Co.
P.O. Box 4068, Station F
New Orleans 18

MARYLAND
Leidy Chemicals Corp.
920 South Eutaw Street
Baltimore

MASSACHUSETTS
D. H. Litter Co., Inc.
291 No. Harvard Street
Allston 34

MICHIGAN
Baker & Collinson, Inc.
12000 Mt. Elliott Avenue
Detroit 12

MINNESOTA
Thompson-Hayward Chemical Co.
909 Second Street, S.
Minneapolis 15

MISSOURI
Abner Hood Chemical Co.
507-17 N. Montgall Avenue
Kansas City 20

J. E. Niehaus & Co., Inc.
3419 Gratiot Street
St. Louis 3

NEBRASKA
Thompson-Hayward Chemical Co.
1110 S. 4th St.
Omaha 8

NEW YORK
Commercial Chemicals, Inc.
211 Hertel Avenue
Buffalo 7

D. H. Litter Co., Inc.
116 East 16th Street
New York 3

OHIO
B. H. Roettker Co.
3732 Lovell Avenue
Cincinnati 11

A. C. Mueller Co., Inc.
616 St. Clair Avenue, N. E.
Cleveland 14

OKLAHOMA
Thompson-Hayward Chemical Co.
P.O. Box 10008
Southwest Station
3909 So. Meridian Avenue
Oklahoma City 19

Thompson-Hayward Chemical Co.
36 N. Guthrie Street
Tulsa 3

OREGON
Fred E. Alsop & Co.
935 N. W. Twelfth Avenue
Portland 9

PENNSYLVANIA
Harry W. Gaffney
1510 Girard Trust Bldg.
Philadelphia 2

John D. Butts
926 Grant Building
Pittsburgh 19

TENNESSEE
Thompson-Hayward Chemical Co.
493 North Front Street
Memphis

Post Brokerage Company
P.O. Box 277
814 10th Avenue N.
Nashville 2

TEXAS
Thompson-Hayward Chemical Co.
P.O. Box 6226, 2627 Weir Street
Dallas 1

Thompson-Hayward Chemical Co.
P.O. Box 4557, 1701 Oliver Street
Houston 13

TEXAS
Thompson-Hayward Chemical Co.
Grayston Sta., P.O. Box 126
San Antonio

VIRGINIA
F. V. Gunn & Company, Inc.
301 E. Franklin Street
P.O. Box 5354
Richmond 20

WASHINGTON
D. B. Smith Company
1016 First Avenue S.
Seattle 4

WISCONSIN
R. L. Ferguson
229 E. Wisconsin Avenue
Milwaukee 2

Pacific Vegetable Oil Corp.

GEORGIA
G. R. Nottingham, Inc.
1257 Chattahoochee Ave., N.W.
Atlanta

ILLINOIS
Daniel G. Hereley Company
1607 Howard Street
Chicago

KENTUCKY
The Argus Company
305 Madrid Building
Louisville

MASSACHUSETTS
R. B. Huber
216 Tremont Street
Boston

MICHIGAN
George E. Moser & Sons, Inc.
Penobscot Building
Detroit

MINNESOTA
Horton-Earl Company
324 N. First Street
Minneapolis

MISSOURI
Ack Sales Company
901 East 13th Avenue
North Kansas City 16
Ivan T. Bauman Company
817 North Second Street
St. Louis

OHIO
Donald McKay Smith Company
550 Hanna Building
Cleveland

OREGON
John C. Robinson
2505 S. E. 11th Street
Portland

PENNSYLVANIA
Baker Industrial Oils Co.
629 Chestnut Street
Philadelphia

TEXAS
W. W. Richarson Company
712 Unit 2, Sante Fe Building
Dallas
Joe Coulson Co.
P. O. Box 14442
Houston

WASHINGTON
W. Ronald Benson, Inc.
820 First Avenue South
Seattle

WISCONSIN
J. W. Copps
P. O. Box 116, Station F
Milwaukee

CANADA
B. & S. H. Thompson & Co.
651 Notre Dame St. West
Montreal, Quebec

CANADA (Cont'd)
B. & S. H. Thompson & Co.
137 Wellington St. West
Toronto, Ontario

M. W. Parsons-Plymouth, Inc.

ARKANSAS
Thompson-Hayward Chemical Co.
P.O. Box 413
123 South Main St.
North Little Rock

CALIFORNIA
Dorsett & Jackson, Inc.
840 East 60 Street
Los Angeles 1

Carmona Chemical Co.
1001—17th Street
San Francisco

COLORADO
Thompson-Hayward Chemical Co.
1501 W. 13th Avenue
Denver 2

FLORIDA
A. J. Passonno
107-22nd Street
Belleair Beach
Indian Rocks

ILLINOIS
Philip E. Calo Co., Inc.
333 North Michigan Avenue
Chicago 1

INDIANA
Meyer Materials, Inc.
P.O. Box 6162
Indianapolis

IOWA
Thompson-Hayward Chemical Co.
1747 West First Street
Davenport

Thompson-Hayward Chemical Co.
S. W. First & Granger
Des Moines

KANSAS
Thompson-Hayward Chemical Co.
727 East Osie
Wichita

KENTUCKY
Crawford Manufacturing Co.
109 North 21st Street
Louisville

LOUISIANA
Thompson-Hayward Chemical Co.
3111 Lowerline
New Orleans 18

MASSACHUSETTS
The J. M. Washburn Co.
P.O. Box 121
Arlington 74

MINNESOTA
Thompson-Hayward Chemical Co.
909 Second St., South
Minneapolis 15

MISSOURI
Thompson-Hayward Chemical Co.
2915 Southwest Blvd.
Kansas City

Thompson-Hayward Chemical Co.
5 Carr Street
St. Louis 2

NEBRASKA
Thompson-Hayward Chemical Co.
1110 South Fourth Street
Omaha 8

OHIO
The A. G. Watt Co.
3407 Warrensville Center Rd.
P.O. Box 874
Cleveland 22

OKLAHOMA
Thompson-Hayward Chemical Co.
828 N. W. Second Street
Oklahoma City

Thompson-Hayward Chemical Co.
36 North Guthrie Street
Tulsa

PENNSYLVANIA
Van Horn, Metz & Co., Inc.
241 East Elm Street
Conshohocken

J. C. Ackerman Co.
Penn-Lincoln Hotel
Pittsburgh 21

TENNESSEE
Chemi-Dent Products
P.O. Box 225
Kingsport

Thompson-Hayward Chemical Co.
463 North Main Street
Memphis 7

TEXAS
Thompson-Hayward Chemical Co.
P. O. Box 226
2300 South Harwood St.
Dallas 1

Thompson-Hayward Chemical Co.
1701 Oliver Street
P. O. Box 4557
Houston 13

TEXAS (Cont'd)
Thompson-Hayward Chemical Co.
P. O. Box 323
Lubbock

Thompson-Hayward Chemical Co.
Box 126, Grayston St. Station
San Antonio 8

Pennsylvania Color & Chemical Company

CALIFORNIA
Horn, Jefferys & Co.
20 W. Burbank Blvd.
Burbank

ILLINOIS
D. G. Hereley Co.
1607 Howard St.
Chicago

MASSACHUSETTS
R. B. Huber
216 Tremont St.
Boston 16

OHIO
T. C. Kiesel
P. O. Box 93
Cincinnati 13
A. C. Mueller Co., Inc.
616 St. Clair Avenue, N. E.
Cleveland 14

WISCONSIN
J. W. Copps, Inc.
P. O. Box 116
Station F
Milwaukee 9

Pennsylvania Industrial Chemical Corp.

CANADA
Charles B. Tennant & Co., Ltd.
Room 400
6555 Cote Des Neiges Road
Montreal 26, Quebec

CANADA (Cont'd)
Charles B. Tennant & Co., Ltd.
1303 Yonge Street
Toronto 7, Ontario
Charles B. Tennant & Co., Ltd.
1369 Richards Street
Vancouver 2, B. C.

Pfister Chemical Works

RHODE ISLAND
Amer. Chemical & Solvent Co.
15 Westminister Street
Providence

Pittsburgh Coke & Chemical Company

COLORADO
E. C. Stone Company
136 West 12th Street
Denver 4

CONNECTICUT
Naugatuck Chemical Division
U. S. Rubber Company
Elm Street
Naugatuck

CANADA
Allied Basic Chemical Company
35 Anderson Avenue
Toronto 12, Ontario

Plastics & Coal Chemical Div. Allied Chemical Corp.

CALIFORNIA
Pacific Coast Chemicals Co.
2060 Third Street
Berkeley 10

E. B. Taylor Co.
442 Colyton Street
Los Angeles 13

GEORGIA
C. L. Burks & Co.
P.O. Box 54
East Point

ILLINOIS
The Cary Co.
228 N. LaSalle St.
Chicago

LOUISIANA
Lastrapes Bros.
322 Board of Trade Place
New Orleans

MASSACHUSETTS
The Truesdale Co.
52 Cambridge Street
Allston 34

NORTH CAROLINA
C. L. Burks & Co.
P.O. Box 1032
Black Mountain

OHIO
J. H. Hinz Co.
405 Rockefeller Bldg.
Cleveland

TEXAS
Roy A. Ribelin Distributing Co.
209 North Hawkins Street
Dallas 26
Roy A. Ribelin Distributing Co.
P.O. Box 21081
Houston
Roy A. Ribelin Distributing Co.
1918 Collingsworth Street
Houston

WISCONSIN
R. L. Ferguson Co.
229 East Wisconsin Avenue
Milwaukee 2

Raybo Chemical Company

CALIFORNIA
L. H. Butcher Company
3628 East Olympic Blvd.
Los Angeles 23
L. H. Butcher Company
15th & Vermont Street
San Francisco 1

ILLINOIS
Fred A. Jensen & Associates
510 North Dearborn Street
Chicago 10

KENTUCKY
Wm. B. Tabler Company
P. O. Box 1254
Louisville 1

LOUISIANA
Roy T. Cucullu Company
4818 Lancelot Drive
New Orleans 22

MARYLAND
Hayward Heubeck Company
1101 North Payson Street
Baltimore 17

MICHIGAN
J. W. Stark Company
20052 Livernois
Detroit 21

MISSOURI
Ack Sales Company
901 East 13th Avenue
North Kansas City 16
Ivan T. Bauman Co.
817 North Second Street
St. Louis 2

NEW YORK
Superior Materials, Inc.
120 Liberty Street
New York 6

NEW YORK (cont'd)
James O. Meyers Sons
290 Larkin St.
Buffalo

OREGON
L. H. Butcher Company
2750 N. W. 31 Avenue
Portland 10

PENNSYLVANIA
Harwood J. Cranston
Rural Route No. 2-Box 48A
Sewickley

TEXAS
W. W. Richarson Company
712 Unit 2 Santa Fe Bldg.
Dallas 2

UTAH
L. H. Butcher Company
407 West 17th South Street
Salt Lake City 15

WASHINGTON
L. H. Butcher Company
1703 Sixth Avenue, South
Seattle 4

CANADA
Charles Tennant & Co. Ltd.
1303 Yonge Street
Toronto, Ontario
Charles Tennant & Co. Ltd.
6555 Cote des Neiges Road
Montreal, Quebec

CANADA (Cont'd)
Charles Tennant & Co. Ltd.
1396 Richards St.
Vancouver, British Columbia
R. L. Sayer
70 Marion Street
Norwood, Winnipeg, Man toba

R-B-H Dispersions

CALIFORNIA
A. J Lynch & Company
2424 Blanding Street
Alameda

A. J. Lynch & Company
4560 East 50th Street
Los Angeles 58

OREGON
Great Western Chemical Co.
2133 N. W. York Street
Portland 10

WASHINGTON
Great Western Chemical Co.
6921 East Marginal Way
Seattle 8

Reichard-Coulston, Inc.

CALIFORNIA
Dorsett & Jackson, Inc.
840 East 60th Street
Los Angeles 1

Carmona Chemical Co.
1001 Seventeenth St.
San Francisco 10

FLORIDA
A. J. Passonno
107-22nd Street
Belleair Beach
Indian Rock Beach
Tampa

INDIANA
Indiana Navel Stores Co.
403 West 17th Street
Indianapolis 2

KANSAS
Morton Myers Co.
27 Southwest Blvd.
Kansas City

KENTUCKY
The L. A. Miller Co.
512 Republic Bldg.
Louisville 2

LOUISIANA
Griffith-Mehaffey Co., Inc.
640 S. Front St.
New Orleans 12

MICHIGAN
Baker & Collinson, Inc.
12000 Mt. Elliott Ave.
Detroit 12

MINNESOTA
Horton-Earl Co.
324 North First St.
Minneapolis 1

NEW JERSEY
H. M. Royal, Inc.
689 Pennington Ave.
Trenton 1

OHIO
Deeks & Co.
6433 Wiehe Rd. Golf Manor
Cincinnati 13

Henry L. Grund, Inc.
406 Bulkley Bldg.
Cleveland 15

OREGON
Van Waters & Rogers, Inc.
3950 N. W. Yeon Avenue
Portland 10

PENNSYLVANIA
John D. Butts
Grant Bldg.
Pittsburgh 19

TEXAS
Thompson-Hayward Chemical Co.
P. O. Box 4557
Houston 13

WASHINGTON
Van Waters & Rogers, Inc.
4000 First Avenue So.
Seattle 4

CANADA
Allied Basic Chemical Co., Ltd.
1100 Craig Street, East
Montreal 24, Quebec
Allied Basic Chemical Co., Ltd.
35 Anderson Avenue
Toronto 12, Ontario

Reichhold Chemicals, Inc.

COLORADO
George C. Brandt, Inc.
1920 Market Street
Denver 2

GEORGIA
Deeks & Company
186 Rio Circle
Decatur

MINNESOTA
George C. Brandt, Inc.
730 Pillsbury Avenue
St. Paul 14

MISSOURI
J. E. Niehaus & Co.
3419-21 Gratiot Street
St. Louis 3

NEW YORK
C. Withington Co.
47-40 5th Street
Long Island City 1

NORTH CAROLINA
Deeks & Company
H. P. T. & D. Railroad Bldg.
High Point

OHIO
Martin C. Hutt Sales Co.
138 Front Street
Berea

Deeks & Company
6433 Wiehe Road
Cincinnati 13

Revolvator Company

ALABAMA
Brungart Jennings
521 Fourth Avenue
Birmingham

CALIFORNIA
J. W. Lafferty Co.
11371 S. Atlantic
Lynwood

CALIFORNIA (Cont'd)
Ira G. Perin Company
575 Howard Street
San Francisco 5

COLORADO
Materials Handling Equip.
1795 Sheridan Blvd.
Denver 14

CONNECTICUT
Industrial Scale & Equip.
740 Railroad Avenue
Bridgeport

FLORIDA
Stiles Conveyors & Trans.
596 N. W. 54th Street
Miami

GEORGIA
J. M. Heard
317 Walton Building
Atlanta 3

ILLINOIS
N-R Equipment, Inc.
2417 N. Ashland Ave.
Chicago 14

J. M. McCubbins
423 First Natl. Bank Bldg.
Peoria

INDIANA
Lawrence Hast
2742 Hartinetz St.
Evansville

Material Handling Equip.
2609 South Broadway
Fort Wayne

Material Handling Equip.
1224 N. Capitol Ave.
Indianapolis 2

KENTUCKY
Robert L. Schmitt
306 East Main St.
Louisville

MARYLAND
John F. Plantholt
102 Old Town Natl. Bank Bldg.
Baltimore 2

Fabricators, Inc.
610 Highland Ave.
Towson

MASSACHUSETTS
Carvill Associates
76 Bertwell Road
Lexington

John E. Williams & Son
50 Needham Street
Newton Highlands

MICHIGAN
Michigan Material Handling
13721 Joy Road
Detroit
Michigan Equip. & Parts
2202 North Franklin
Flint 6

MINNESOTA
Minnesota Cem-Steel Co.
1954 University Ave.
St. Paul

MISSOURI
L. O. Hutcheson
Centropolis Station
Box 6222
Kansas City 26

W. W. Munroe Company
800 E. Big Bend Road
St. Louis

NEBRASKA
Alger Equipment Co.
619 Douglas Street
Omaha

NEW JERSEY
Jersey Industrial Trucks
153 Chestnut Ave.
Irvington

H. W. Stoddard & Sons
165 Franklin Ave.
Nutley 10

NEW YORK
Rushmore, Weber & Case
950 New London St.
Latham

A. E. Cripps
30 East 60th St.
New York 22

NEW YORK (Cont'd)
Fairbanks Company
393 Lafayette Street
New York 3

Lawrence W. Cook
State Tower Bldg.
Syracuse

NORTH CAROLINA
Material Handlers, Inc.
P.O. Box 3614
Charlotte

OHIO
Canton Elevator Co.
1220 Fifth S. W.
Canton 11

Ken Dimond Company
3455 Edwards Road
Cincinnati

Equipment for Industry
7702 Carnegie Avenue
Cleveland 3

F. L. Purdy Company
655 N. Cassady Ave.
Columbus 3

John P. Mulford
Far Hills, Box 603
Dayton 9

Kern Truck Sales, Inc.
611 Daniels at Griffin St.
Toledo 8

OREGON
Oregon Handling Equip.
2949 N. W. St. Helen's Rd.
Portland

PENNSYLVANIA
Autolift Accessory & Engineering Co.
P.O. Box 1004
Bethlehem

Autolift Accessory & Engineering Co.
414 Market Street
Kingston

Penn Industrial Equip.
P.O. Box 543
Lancaster
Wolfston Engineering, Inc.
324 Fourth Avenue
Pittsburgh 22
C. C. McCarthy
851 Louisa Street
Williamsport

RHODE ISLAND
Wheeler Handling Equip.
43 Blackamore Avenue
Auburn

TENNESSEE
Mechanical Equip. Co.
718 Market St.
Knoxville

TEXAS
Leslie Distributing Div.
2001 Levee Street
Dallas 7

M. C. Thompson
1022 N. Edgefield Ave.
Dallas 8

UTAH
Equipment Supply Co.
16 Post Office Place
Salt Lake City

VIRGINIA
Haight Engineering Co.
P.O. Box 260
215 Fifth Street, N. W.
Charlottesville

WASHINGTON
Cascade Handling Equip.
1741 First Ave. South
Seattle 1

WEST VIRGINIA
Industrial Equip. Co.
913 Brooks Street
Charleston 23

WISCONSIN
Jos. S. Babush Co.
2401 N. Maryland Ave.
Milwaukee 11

CANADA
Mahaffy Iron Works Co., Ltd.
145 Kendal Avenue
Toronto, Ontario

Ross & Rowe, Inc.

CALIFORNIA
A. J Lynch & Co.
2424 Blanding St.
Alameda
A. J. Lynch & Co.
4560 E. 50th St.
Los Angeles 58

MASSACHUSETTS
R. T. Freeman Co.
Hingham Industrial Center
Hingham

MICHIGAN
Baker & Collinson, Inc.
12000 Mt. Elliott
Detroit 12

MINNESOTA
Horton-Earl Co.
324 North 1st St.
Minneapolis 1

MISSOURI
Morton-Myers Co.
Southwest Blvd. at State Line
Kansas City 8

MISSOURI (Cont'd)
Independent Oil Co.
3930-60 Chouteau Avenue
St. Louis 10

OHIO
John H. Thier Co.
2512 Highland Ave.
Cincinnati 19

TEXAS
Southwest Sales Co., Inc.
P. O. Box 9275
Dallas
Joe Coulson Co.
2525 Cline St.
Houston

UTAH
Naisbitt Sales Agency
3959 Sunny Dale Drive
Salt Lake City 17

WASHINGTON
D. B. Smith Co.
1016 First Ave., South
Seattle 4

St. Joseph Lead Company

ALABAMA
Harwick Standard Chem. Co.
Albertsville

ARKANSAS
Thompson-Hayward Chem. Co.
P. O. Box 413
North Little Rock

CALIFORNIA
Harwick Standard Chem. Co.
1248 Wholesale St.
Los Angeles
L. H. Butcher Co.
15th & Vermont St.
San Francisco

COLORADO
Application Engineers, Inc.
2150 So. Bellaire Street
Denver

FLORIDA
C. Withington Co., Inc.
1641 Landon Avenue
Jacksonville

GEORGIA
Southern States Chem. Co.
1061 W. Marietta St., N. W.
Atlanta

ILLINOIS
Fred A. Jensen & Assoc.
510 N. Dearborn St.
Chicago

INDIANA
Meyer Materials, Inc.
5505 No. Keystone
Indianapolis

KANSAS
Thompson-Hayward Chemical Co.
727 E. Osie
Wichita

MARYLAND
William McGill
237 President St.
Baltimore

MASSACHUSETTS
Harwick Standard Chemical Co., (of Mass.) Inc.
661 Boylston St.
Boston

MICHIGAN
Matteson-Van Wey, Inc.
403 Baltimore Avenue, W.
Detroit

MINNESOTA
George C. Brandt, Inc.
739 Pillsbury Avenue
St. Paul 14

MISSOURI
Thompson-Hayward Chemical Co.
2915 Southwest Blvd.
Kansas City
J. E. Niehaus & Co., Inc.
3419-21 Gratiot St.
St. Louis

NEBRASKA
Thompson-Hayward Chemical Co.
1110 S. Fourth St.
Omaha

NEW JERSEY
R. E. Carroll, Inc.
P. O. Box 139
Trenton

NEW YORK
James O. Meyers Sons
290 Larkin St.
Buffalo
C. Withington Co., Inc.
47-40 Fifth Street
Long Island City

NORTH CAROLINA
Southern States Chemical Co.
1039 Bond St.
Charlotte

OHIO
Harwick Standard Chemical Co.
60 S. Seiberling St.
Akron
C. L. Zimmerman Co.
N. 303 Cincinnati Union Terminal
Cincinnati

OKLAHOMA
Thompson-Hayward Chemical Co.
3909 Meridian Ave.
Oklahoma City 19
Thompson-Hayward Chemical Co.
36 N. Guthrie
Tulsa

OREGON
Cordano Chemical Co.
56 S. E. Belmont St.
Portland

PENNSYLVANIA
Van Horn, Metz & Co., Inc.
241 E. Elm St.
Conshohocken
St. Joseph Lead Co.
Monaca,

SOUTH CAROLINA
Southern States Chemical Co.
25 Peden St.
Greenville

TENNESSEE
Thompson-Hayward Chemical Co.
493 N. Front St.
Memphis

TEXAS
Thompson-Hayward Chemical Co.
P. O. Box 6226
Dallas
Thompson-Hayward Chemical Co.
P. O. Box 4557
Houston
Thompson-Hayward Chemical Co.
222 Seguin St.
San Antonio

WASHINGTON
Great Western Chemical Co.
1242 Sixth Avenue, So.
Seattle

Silberline Manufacturing Company, Inc.

CALIFORNIA
E. B. Taylor Co.
442 Colyton Street
Los Angeles

R. E. Flatow & Co., Inc.
P.O. Box 1166
Oakland

GEORGIA
Deeks & Company
186 Rio Circle
Decatur

ILLINOIS
Carl A. Lechner Co.
1515 West Howard St.
Chicago 26

KENTUCKY
Wm. B. Tabler Company
P.O. Box 1254
Louisville

LOUISIANA
Lastrapes Bros.
322 Board of Trade Arcade
New Orleans

MASSACHUSETTS
R. T. Freeman Company
Hingham Industrial Center
Hingham

MICHIGAN
George B. Horsfall
1353 Whittier Road
Grosse Pointe

MINNESOTA
Horton-Earl Company
324 North First St.
Minneapolis

MISSOURI
Ack Sales Company
P.O. Box 31
Kansas City

Clifford L. Iorns Co.
216 South Seventh St.
St. Louis

NEW YORK
Henry Baer
1225 Broadway
New York

OHIO
Ducros & Company
3592 Lee Road
Shaker Heights

PENNSYLVANIA
A. C. Hurlbrink
3701 North Broad St.
Philadelphia

Joseph A. Burns & Son
124 Harrison Avenue
Pittsburgh 2

TEXAS
E. B. McCullough
2301 Commerce St.
Houston

J. Lee Smith & Company, Inc.

CALIFORNIA
A. J. Lynch & Co.
2424 Blanding St.
Alameda
E. B. Taylor Co.
442 Colyton St.
Los Angeles

COLORADO
L. H. Herr Co.
712 Interstate Trust Bldg.
16th & Lawrence Sts.
Denver

GEORGIA
Geo. E. Missbach & Co.
705 Henry Grady Bldg.
Atlanta

ILLINOIS
Fred A. Jensen & Associates
510 No. Dearborn St.
Chicago

KANSAS
Thompson-Hayward Chemical Co.
727 East Osie
P. O. Box 2897 South Wichita Station
Wichita

KENTUCKY
The Argus Co., Inc.
305 Madrid Bldg.
Louisville

LOUISIANA
Russell Chemical Co.
5932 Louis XIV St.
New Orleans

MARYLAND
A. B. Kohl Sales Co.
4615 Edmondson Ave.
Baltimore

MASSACHUSETTS
Barrett & Breen Co.
80 Federal St.
Boston

MICHIGAN
Theo. F. Gehle Co.
603 Fisher Bldg.
Detroit

MINNESOTA
Worum Chemical Co.
2130 Kasota Ave.
St. Paul

MISSOURI
Thompson-Hayward Chemical Co.
29th & Southwest Blvd.
Kansas City
H. R. Hamberg Co.
7273 Maryland Ave.
St. Louis

NEW YORK
James O. Meyers Sons
Wilson Warehouse Inc.
290 Larkin St.
Buffalo

OHIO
The Paul Wiemer Co.
2089 Sherman Ave.
Cincinnati
A. C. Mueller Co., Inc.
616 St. Clair Ave., N. E.
Cleveland

OKLAHOMA
Thompson-Hayward Chemical Co.
360 No. Guthrie
Tulsa

OREGON
Great Western Chemical Co.
2133 N. W. York St.
Portland

PENNSYLVANIA
Mr. A. C. Hurlbrink
3701 No. Broad St.
Philadelphia
Joseph A. Burns & Son
124 Harrison Ave.
Pittsburgh

TEXAS
Texas Solvents & Chemicals Co.
2500 Vinson St.
Dallas
Texas Solvents & Chemicals Co.
8501 Market St.
Houston

WASHINGTON
L. H. Butcher Co.
1703 6th Ave., South
Seattle

CANADA
Chas. Tennant & Co., Ltd.
6555 Cote des Neiges Rd.
Room 440
Montreal, Quebec

CANADA (Cont'd)
Chas. Tennant & Co., Ltd.
1303 Yonge St.
Toronto, Ontario
Chas. Tennant & Co., Ltd.
1396 Richards Street
Vancouver 2, B. C.

Southern California Minerals Company

CALIFORNIA
A. J. Lynch & Company
2424 Blanding Avenue
Alameda

CALIFORNIA (Cont'd)
John K. Bice Company
440 Seaton Street
Los Angeles

MISSOURI
G. S. Robins & Company
126 Chouteau Avenue
St. Louis

NEW YORK
Whittaker, Clark & Daniels, Inc.
260 West Broadway
New York 13

OREGON
Great Western Chemical Company
2201 N. W. York Street
Portland

TEXAS
Roy A. Ribelin Distributing Co.
209 North Hawkins Street
Dallas
Roy A. Ribelin Distributing Co.
P.O. Box 21081
Houston 26

WASHINGTON
Great Western Chemical Co.
6921 E. Marginal Way
Seattle

CANADA
Overseas Commodities Ltd.
750 Industrial Avenue
Vancouver, B. C.

MEXICO
Casa Molina Font
Apartado Postal 8719
Mexico 1, D. F.

Sprayon Products, Inc.

CALIFORNIA
Bergdahl Associates
1485 Bayshore Boulevard
San Francisco

Standard Ultramarine & Color Company

CALIFORNIA
Paul W. Wood Company
P. O. Box 6797
2600 South Eastern Ave.
Los Angeles 22
Paul W. Wood Company
350 Townsend Street
San Francisco 7

COLORADO
Thompson-Hayward Chemical Co.
1501 West 13th Avenue
Denver

IOWA
Thompson-Hayward Chemical Co.
802 Fishertown Road
P. O. Box 176
Davenport
Thompson-Hayward Chemical Co.
Southwest First and Granger
Des Moines 15

KANSAS
Thompson-Hayward Chemical Co.
727 East Osie Street
Wichita 2

MASSACHUSETTS
L. E. Crossley
Room 435—80 Federal Street
Boston 10

MINNESOTA
Williard N. Swanson Co.
1015 North Third Street
Minneapolis 1

MISSOURI
Thompson-Hayward Chemical Co.
29th & Southwest Blvd.
Kansas City 8

NEBRASKA
Thompson-Hayward Chemical Co.
1110 South 4th Street
Omaha 8

OHIO
J. C. Drouillard Co.
264-66 Rockefeller Bldg.
Cleveland 13

OKLAHOMA
Thompson-Hayward Chemical Co.
3909 S. Meridian Ave.
P. O. Box 10008 S. W. Sta.
Oklahoma City 19
Thompson-Hayward Chemical Co.
36 North Guthrie Street
Tulsa 3

PENNSYLVANIA
Jos. A. Burns & Son
124 Harrison Avenue
Pittsburgh 2

TEXAS
Thompson-Hayward Chemical Co.
P. O. Box 6226
2627 Weir Street
Dallas
Thompson-Hayward Chemical Co.
P. O. Box 4557
1701 Oliver Street
Houston
Thompson-Hayward Chemical Co.
P. O. Box 323
Lubbock
Thompson-Hayward Chemical Co.
P. O. Box 126, Grayston St. Sta.
222 Seguin Street
San Antonio 8

WISCONSIN
R. L. Ferguson
229 East Wisconsin Ave.
Milwaukee

CANADA
The Caledonia Co., Ltd.
751 Victoria Square
Montreal, Quebec

CANADA (Cont'd)
The Caledonia Co., Ltd.
1195 Bloor Street West
Toronto 4, Ontario
The Caledonia Co., Ltd.
4456 Dunbar Road
Vancouver, B. C.

Fred'k A. Stresen-Reuter, Inc.

CALIFORNIA
E. S. Browning Co.
2321 Yates Ave.
Los Angeles 22

E. S. Browning Co.
1515 Third St.
San Francisco 7

KENTUCKY
Wm. B. Tabler Co.
903 W. Main St.
Louisville 1

MICHIGAN
J. W. Stark Co.
12345 Schaefer Highway
Detroit 27

NEW YORK
Superior Materials, Inc.
120 Liberty St.
New York 6

PENNSYLVANIA
A. C. Hurlbrink
3701 N. Broad St.
Philadelphia 40

Tamms Industries, Inc.

CALIFORNIA
S. L. Abbot Co.
4255 District Blvd.
Los Angeles

Van Waters & Rogers, Inc.
1422 E. Sixth St.
Los Angeles

CALIFORNIA (Cont'd)
S. L. Abbot Co.
135 King St.
San Francisco

Van Waters & Rogers, Inc.
2730 Sixteenth St.
San Francisco

COLORADO
Fred Coombs
160 Eudora St.
Denver

INDIANA
Ulrich Chemicals Inc.
2640 W. Mnnesota
Indianapolis

KENTUCKY
222 Walter Moser
Riverside Drive
Ft. Thomas

MASSACHUSETTS
A. H. Wandtke
234 East St.
Lexington

MICHIGAN
Geo. E. Moser & Son
2961 Penobscot Bldg.
Detroit

MINNESOTA
Ellsworth Bushnell
98 Cambridge
St. Paul

MISSOURI
Ack Sales Co.
901 E. 13th St.
Kansas City

Service Brokerage
7205 Oakland St.
St. Louis

NEW YORK
Commercial Chemicals
211 Hertel Ave.
Buffalo

D. B. Becker Co.
150 Nassau St.
New York

OHIO
Rice & Co.
325 Bulkley Bldg.
Cleveland

Mr. J. A. Kendall
P. O. Box 79
Solon

PENNSYLVANIA
Jos. A. Burns & Son
124 Harrison Ave.
Pittsburgh

Dowdy Bros.
33rd & Arch Sts.
Philadelphia

TENNESSEE
Robt. F. Sheahan Co.
M&M Bldg., Suite 728
Memphis

TEXAS
Southwest Sales Co.
2400 Coombs St.
Dallas

Van Waters & Rogers Inc.
P. O. Box 1188
Dallas

WASHINGTON
Van Waters & Rogers Inc.
4000 First St. So.
Seattle

Van Waters & Rogers Inc.
809 Washington St.
Spokane

WISCONSIN
Standard Brokerage Co.
225 Detroit
Milwaukee

CANADA
Drew Brown Ltd.
5410 Ferrier St.
Montreal, Quebec

Drew Brown Ltd.
50 Titan Road
Toronto, Ontario

Van Waters & Rogers Inc.
2625 Skeena St.
Vancouver, B. C.

Thibaut & Walker Company

GEORGIA
W. E. Sigafoose
739 E. Morningside Dr., N. E.
Atlanta

NEW YORK
Arthur I. Nortman Co.
1707 King's Highway
Brooklyn

NEW YORK (Cont'd)
F. F. Salamon Co.
Box 309
Nyack

PENNSYLVANIA
E. W. Kaufmann
P. O. Box 27
Flourtown

Troy Chemical Company

CALIFORNIA
Martin, Hoyt & Milne
906 E. Third St.
Los Angeles

Martin, Hoyt & Milne
Merchants Exchange Bldg.
San Francisco

FLORIDA
A. J. Passonno
107—22nd St.
Belleair Beach
Indian Rocks

ILLINOIS
Kraft Chemical Co.
917 W. 18th St.
Chicago

MASSACHUSETTS
Herbert B. Lewis Co.
30 Huntington Ave.
Boston

MICHIGAN
Gerald Fahey
2591 W. Grand Blvd.
Detroit

MINNESOTA
M. H. Baker Co.
1645 Hennepin Ave.
Minneapolis

MISSOURI
Clifford Iorns Co.
216 South 7th St.
St. Louis

NEW JERSEY
J. Stern & Co.
19 Deer Head Drive
Bound Brook

NEW YORK
C. Withington Co.
47-40 Fifth St.
Long Island City

OHIO
Palmer Supplies Co.
1401 Times Star Bldg.
Cincinnati

Rice & Co.
325 Bulkley Bldg.
Cleveland

OREGON
Great Western Chemical Co.
2133 N. W. York
Portland

PENNSYLVANIA
Dowdy Brothers
Wilford Bldg.
33rd & Arch Sts.
Philadelphia

The O. Hommel Co.
209 Fourth Ave.
Pittsburgh

TEXAS
Van Waters & Rogers, Inc.
2316 Portsmouth
Houston

WASHINGTON
Great Western Chemical Co.
6921 E. Marginal Way
Seattle

CANADA
Pigment & Chemical Co. Ltd.
6333 Decarie Blvd.
Montreal, Quebec

MEXICO
Proveedora Quimicas Industrial S.A.
Apartado Postal 28942
Mexico 17, D. F., Mexico

U B S Chemical Corp.

CALIFORNIA
Everitt & Ray, Inc.
1556 Industrial St.
Los Angeles 21

DELAWARE
J. Dalton Couig, Jr.
32 Benning Road
Claymount

OHIO
Donald J. Coffey
3020 Euclid Heights Blvd.
Cleveland Heights

Fraser & Davis Industrial Supplies Ltd.
Room 230
1980 Sherbrooke Street, West
Montreal 25, Quebec

United Ultramarine & Chemical Co., Inc.

CALIFORNIA
R. E. Flatow & Co., Inc.
10 Madison St.
P. O. Box 1166
Oakland 4

ILLINOIS
Fred A. Jensen & Assocs.
510 North Dearborn St.
Chicago 10

LOUISIANA
Breffeilh & Sheahan Co.
P. O. Box 13222
New Orleans 25

MASSACHUSETTS
Barrett & Breen
80 Federal St.
Boston 10

MICHIGAN
Baker & Collinson
12000 Mt. Elliott Ave.
Detroit 12

MINNESOTA
Horton Earl Co.
324 North 1st St.
Minneapolis 1

NORTH CAROLINA
Charles L. Burks Co.
P. O. Box 1032
Black Mountain,

OHIO
Ducros & Co., Inc.
3592 Lee Road
P. O. Box 3945
Shaker Heights 20

PENNSYLVANIA
Van Horn, Metz & Co., Inc.
241 East Elm St.
Conshohocken

Velsicol Chemical Corp.

CALIFORNIA
E. B. Taylor Company
442 Colyton Street
Los Angeles

E. M. Walls Company
353 Sacramento Street
San Francisco

MISSOURI
Independent Oil Company
3930 Chouteau Avenue
St. Louis

OREGON
Great Western Chemical Co. of Oregon
2133 N. W. York
Portland 10

WASHINGTON
D. B. Smith Company
1016 First Avenue South
Seattle

T. F. Washburn Company

CALIFORNIA
The B. E. Dougherty Co.
1807 E. Olympic Blvd.
Los Angeles

FLORIDA
Palmer Supplies Co. of Fla.
211 E. Robinson Ave.
P. O. Box 784
Orlando

ILLINOIS
Don Fitzgerald Co.
5875 N. Lincoln Ave.
Chicago

INDIANA
The August Offman Co.
P. O. Box 41115
Indianapolis

KANSAS
Vulcan Sales Company
5920 Nall Avenue
Mission

MASSACHUSETTS
Raw Materials Co., Inc.
140 Federal Street
Boston 10

MISSOURI
Service Brokerage Co.
7205 Oakland Avenue
St. Louis

NEW YORK
Raw Materials Co., Inc.
220 East 42nd Street
New York 17

PENNSYLVANIA
Van Horn, Metz & Co., Inc.
241 East Elm Street
Conshohocken

J. R. Eckley
Coxcomb Hill Road
RD 2
New Kensington

WASHINGTON
Durkin Chemicals Co., Inc.
2605 Second Avenue
Seattle

West Virginia Pulp and Paper Company

CALIFORNIA
Braun Corporation
1363 South Bonnie Beach Place
Los Angeles 54
Braun-Knecht-Heimann Co.
1400 16th Street
San Francisco 19

Western Dry Color Company

KENTUCKY
Wm. B. Fabler Company
P. O. Box 1254
Louisville 1

MISSOURI
Thompson-Hayward Chemical Co.
29th & Southwest Blvd.
Kansas City

MISSOURI (Cont'd)
Thompson-Hayward Chemical Co.
5 Carr Street
St. Louis

OHIO
Fred Kamin
P. O. Box 2670
Lakewood 7

PENNSYLVANIA
John D. Butts
926 Grant Building
Pittsburgh

Whittaker, Clark & Daniels, Inc.

FLORIDA
Palmer Supplies Company
211 East Robinson Avenue
Orlando

GEORGIA
Charles E. Baker, Inc.
P. O. Box 10683
Atlanta

ILLINOIS
Harry Holland & Son, Inc.
9 South Clinton Street
Chicago 6

LOUISIANA
Edward W. Ortenbach
411 Balter Building
New Orleans

MICHIGAN
Harry Holland & Son, Inc.
10600 Puritan Avenue
Detroit 38

OHIO
Leverett A. Anderson Company
P. O. Box 5250
Akron 13

Palmer Supplies Company
Times Star Building
Cincinnati 2

Palmer Supplies Company
2281 Scranton Road
Cleveland 13

PENNSYLVANIA
The R. Peltz Company
33rd & Arch Streets
Philadelphia 4

TENNESSEE
L. E. Offutt Company
P. O. Box 8063
Memphis 4

TEXAS
Roy A. Ribelin Distributing Co.
P. O. Box 21081
Houston 26

CANADA
Dalex Company, Ltd.
6834 Second Avenue
Rosemount, Montreal 36, Quebec

CANADA (Cont'd)
Dalex Company, Ltd.
P. O. Box 92
Toronto 15, Ontario

Woburn Chemical Corp.

CALIFORNIA
Martin, Hoyt & Milne
906 East 3rd Street
Los Angeles

Martin, Hoyt & Milne
Merchants Exchange Bldg.
San Francisco 4

ILLINOIS
Fred A. Jensen
510 North Dearborn St.
Chicago 10

MARYLAND
F. L. Sutton
Route 9, Box 300
Pasadena

MASSACHUSETTS
Woburn Degreasing Co.
Woburn

MICHIGAN
O'Connor Chemicals, Inc.
10586 Knodell Street
Detroit 12

MINNESOTA
Worum Chemical Co.
2130 Kasota Avenue
St. Paul 14

MISSOURI
Nolte Brokerage Co.
721 Clark Avenue
St. Louis

OHIO
F. F. Myers Company
Akron Savings & Loan Bldg.
Akron 8

OHIO (Cont'd)

C. M. Durbin Company
Tri-State Building
432 Walnut Street
Cincinnati 2

J. H. Hinz Company
405 Rockerfeller Bldg.
Cleveland 13

OREGON
Martin, Hoyt & Milne
1501 N. W. Kearney
Portland

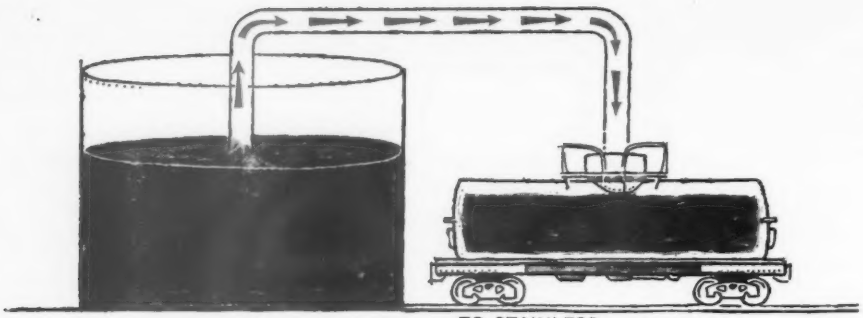
PENNSYLVANIA
J. C. Ackerman Company
Penn-Lincoln Hotel
Pittsburgh 21

Lincoln Industrial Chemical Co.
134 Orange Street
Reading

TEXAS
W. W. Richerson Company
712 Unit 2—Santa Fe Bldg.
Dallas 2

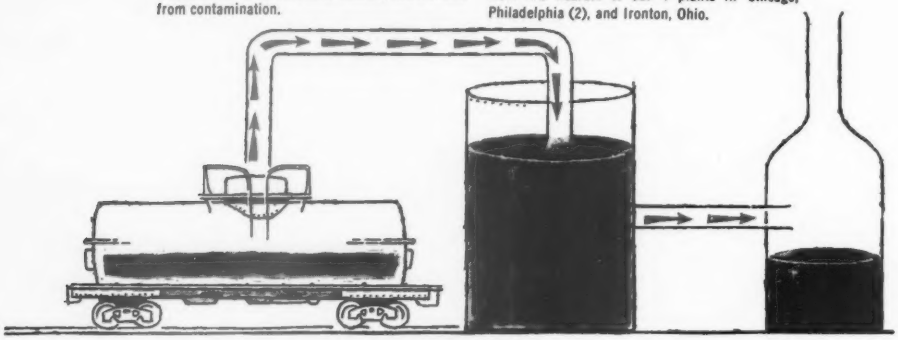
E. B. McCullough Company
2301 Commerce Street
Houston 2

WASHINGTON
Martin, Hoyt & Milne
1016 First Avenue South
Seattle 4



FROM OUR STILL RECEIVER . . .
Plastics and Coal Chemicals Division has perfected methods of storage and transfer for molten phthalic anhydride which assure color stability and freedom from contamination.

TO STAINLESS TANK CAR OR TRUCK
For short hauls of 100 miles or less, tank trucks are recommended. Molten phthalic will be shipped from the nearest of our 4 plants in Chicago, Philadelphia (2), and Ironton, Ohio.



FROM STAINLESS TANK CAR OR TRUCK
Tank cars may be unloaded from the top, by inert gas pressure, or from the bottom, by gravity flow.

TO YOUR STORAGE TANK
An 18-8 stainless steel insures against discoloration. Tank should be well insulated, with internal heating coils and temperature controls. Molten phthalic is blanketed with inert gas.

TO END PROCESS
Molten phthalic is readily pumped to process by centrifugal pump. Its high temperature speeds processing, and increases capacity of existing equipment.

The Care and Handling of Phthalic Anhydride

Large users of Phthalic Anhydride can realize substantial savings by converting to molten phthalic. For smaller users, Plastics and Coal Chemicals Division ships the flake form in unit loads designed for peak efficiency at the receiving end.

As your business grows, so do your raw material tonnages. As this happens, you may eventually have to ask yourself, "Will it pay me to switch to molten phthalic?"

We have helped many customers answer this question. It's a matter of carefully estimating the cost savings you may expect . . . and comparing these savings with your anticipated investment in handling equipment for molten phthalic.

Shipped in molten form, Phthalic Anhydride will cost you less per pound than flake. The saving is ½¢ per pound.

You must also consider the labor savings—no bags to unload, transport, empty or dispose of. And, because you introduce the phthalic at 150°C, you can save on process heat requirements. Other benefits that help swing the balance are less easy to measure in dollars and cents:

- Increased productive capacity resulting from shorter reaction cycles with hot molten phthalic
- Release of precious indoor storage space
- Elimination of waste and dust
- Reduction of contamination possibilities (molten phthalic is handled in a closed system)

Perhaps it's time you discussed conversion—or some other modification in your handling of Phthalic Anhydride, be it molten or flake. Call our representative or write us direct and we'll get in touch with you posthaste.

And in the Flake Form . . .

Plastics and Coal Chemicals Division ships a variety of unity load arrangements to speed unloading at the receiving end. Before shipment, bags are "kneaded" between giant rollers to give them the firmness and flatness that make ideal unit loads.

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.

Allied Chemical

TRADE NAME DIRECTORY

A

AA—Refined castor Oil. **Baker Castor Oil Co.**
Abay—Mill & mixing machinery. **Paul O. Abbé Inc.**
Abbé—Mills & mixing machinery. **Paul O. Abbé Inc.**
Abbé—Mills & mixing machinery. **Abbé Engineering Company.**
Abestol—Extender. **Carbola Chemical Co., Inc.**
Abitol—Technical hydroabietyl alcohol. **Hercules Powder Company**
AC—Polyethylene. **Semet-Solvay Petrochemical Division, Allied Chemical Corp.**
Accol Resin—Resin emulsion. **Amalgamated Chemical Corp.**
Accu-Por—Round nozzle top paint cans. **American Can Co.**
Acetate P.A.—Deodorant. **Givaudan-Delawanna, Inc.**
Acetex—Emulsion copolymer. **Naugatuck Chemical Div., U. S. Rubber Co.**
Acintene—Pinenes and turpentine. **Arizona Chemical Company**
Acintol—Tall oil. **Arizona Chemical Company**
Acme—Shellac varnish. **Acme Shellac Products Co.**
Aconew Extra—Refined tall oil fatty acids. **Newport Industries, Inc., Div. of Heyden-Newport Chemical Corp.**
Aconon—Refined tall oil. **Newport Industries, Inc.**
Acosix—Refined tall oil. **Newport Industries, Inc. Div. of Heyden-Newport Chemical Co.**
Aquagel—Bodying Agent. **Troy Chemical Co.**
Acrawax C—Synthetic wax. **Glyco Products Co., Inc.**
Acryloid—Acrylic ester resins. **Rohm & Haas Company**
Acrylon—Acrylic rubber. **The Borden Company**
Acrylonitrile — Monomers. **Union Carbide Chemicals Co.**
Acrysol—Acrylic resin. **Rohm & Haas Company**
Activ-8—Drier-stabilizer. **R. T. Vanderbilt Co.**
Acyralasein—Casein solution. **W. H. Fales Co.**
Adher-O-Flex—Esterfied Shellac. **Acme Shellac Products Co.**
Adipol—Plasticizer. **Ohio-Apex Division**
Adlube—Plastic mold lubricant. **Advance Solvents & Chemicals Div. of Carlisle Chemical Works, Inc.**
ADM Adols—Fatty Alcohols. **Archer Daniels Midland Company**
ADM Ester Gum—Complete line of Ester Gums. **Archer Daniels Midland Company**
ADM Natural Resins—Congo, Damar, East India, Kauri Gum, Manila Gum. **Archer Daniels Midland Company**
ADM Processed Congo—Fused & Esterified Congo Gum. **Archer Daniels Midland Company**
ADM Unadols—Fatty Alcohols. **Archer Daniels Midland Company**
Adol—Fatty Alcohols. **Archer Daniels Midland Company**
A D P—Carbon Black dispersions. **Acheson Dispersed Pigments Co.**
Advacide—Fungicidal compound. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advagum—Synthetic rubber extender. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advamin—Fungicidal compound. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advamix—Wetting agent. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advan—Accelerators. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advance—Naphthenate paint dryers. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advaresin—Drying oil extenders. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advasol—Driers. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advastab—Vinyl resin stabilizers. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advawax—Petroleum waxes. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Advawet—Wetting agents. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Aero—Maleic and Phthalic Anhydrides; various grades of Aluminum. Zinc and Calcium Metallic Soaps. **American Cyanamid Company, Industrial Chem. Div.**
Aerosol—Surface Active Agents. **American Cyanamid Company, Industrial Chem. Div.**
Age-Best Dispersion—Anti-Oxidant. **Borden Co.**
Air-Matic—Small parts washer. **The Protectoseal Co.**
Alamac—Fatty amine esters. **General Mills, Inc.**
Alamask—Paint deodorant. **Rhodia, Inc.**
Alamine—Primary fatty amines. **General Mills, Inc.**
Albacar—Precipitated calcium carbonate. **C. K. Williams & Co.**
Albalith—Lithopone. **New Jersey Zinc Co.**
Albron—Aluminum Powders and Pastes. **Aluminum Company of America**
Alcoa—Aluminum Powders and Pastes. **Aluminum Company of America**
Alcogum—Deflocculating Agent. **Alco Oil and Chemical Corp.**
Alcolec—Lecithin. **American Lecithin Co., Inc.**
Alcroyd—Long Oil Alkyd. **Crosby Chemicals, Inc.**
Algel—Gelling agent. **Raybo Chemical Co.**
Aliphat—Tall oil fatty acids. **General Mills, Inc.**
Alkaterges—Surface active agents. **Commercial Solvents Corporation**
Alkyum—Alkyd Resin. **Adco Chemical Co.**
Alodine—Protective coating chemicals for aluminum and aluminum alloys. **Amchem Products, Inc.**
Alrosols—Surface Active agent. **Geigy Industrial Chemicals**
Alsibronz—Water ground mica. **Franklin Mineral Products Company**
Alumagel—Gelling Agent. **Witco Chemical Co., Inc.**
Amberlac—Modified alkyds. **Rohm & Haas Co.**
Amberol—Varnish and lacquer resins. **Rohm & Haas Company**
Ambrose—Filling and sealing machines and strainers. **C. M. Ambrose Co.**
Amine O—Surface active agent. **Geigy Industrial Chemicals**
Amsco-Solv—A group of intermediate aromatic petroleum solvents in varying boiling ranges. **American Mineral Spirits Company**
Amyl Acetate—Synthetic solvent. **Industrial Div., Pennsalt**
Analyte—Color comparator. **Crown Engineering & Sales Company**
Anathix—Thixotropic alkyd. **General Electric Co. (West Coast)**
Angular—Mixer. **Troy Engine & Machine Co.**
Ansol—Solvents. **U. S. Industrial Chemicals Co.**
Antifoam A—Silicone defoamer. **Dow Corning Corp.**
Antioxidant B—Anti-skinning agent and antioxidant. **National Aniline Division, Allied Chemical Corp.**
Antioxidant D—Anti-skinning agent and antioxidant. **National Aniline Division, Allied Chemical Corp.**
AntiSag—Anti-sagging, anti-settling, wetting and dispersing agent. **Raybo Chemical Company**
AntiSilk—Anti-silking, anti-floating agent. **Raybo Chemical Company**
Antiskin—Anti-skinning agent. **Raybo Chemical Company**
Antistat—Anti-static agent. **Raybo Chemical Company**
AP—Aromatic Plasticizer. **Pennsylvania Industrial Chemical Co.**
Apco—Aliphatic hydrocarbon thinner. **Anderson-Prichard Oil Corporation**
Apcothinner—Aliphatic petroleum thinner. **Anderson-Prichard Oil Corporation**
Aquablak—Carbon and bone blacks. **Columbian Carbon Co.**
Aqualastic—Casein solution. **W. H. Fales Co.**
Aquasperse 30—Casein vehicle for emulsion paints. **American Resinous Chemicals Corp.**
Araldite—Epoxy resins. **Ciba Company Inc.**
A-Resin—Heat convertible unsaturated aliphatic pure hydrogen polymer. **Enjay Company, Inc.**
Aritemp—Epoxy Casting Resins. **Aries Laboratories, Inc.**
Aricite—Grinding balls. **Porcelain Div., Ferro Corp.**
Armac—Acetic acid salts of fatty amines. **Armour Chemical Division**
Armeens—High molecular weight aliphatic amines, paint additive. **Armour Co., Chemical Divisidn**
Armids—Aliphatic amides. **Armour Co., Chemical Div.**
Arochem—Modified Phenolic Resins, modified maleic resins, specialty resins. **Archer Daniels Midland Company**
Aroclor—Chlorinated biphenyl resins. **Monsanto Chemical Company**
Arofene—Pure Phenolic Resins. **Archer Daniels Midland Company**
Aroflat—Alkyds & Specialties for Flat Finishes. **Archer Daniels Midland Company**
Arofio—Channel black. **J. M. Huber Corp.**
Arocstocrat — Potato Starch. **Morningstar-Paisley, Inc.**
Aroplax—Alkyd and Allied Resins. **Archer Daniels Midland Company**
Aropol—Copolymer Modified Alkyds, Polyester Resins. **Archer Daniels Midland Company**
Arothex—Thixotropic alkyd. **Archer Daniels-Midland Co.**
Arquads—Quaternary ammonium salts. **Armour Chemical Div.**
Arrow Ink Black—Channel Black. **J. M. Huber Corp.**
ASA—Antiskinning agent and antioxidant. **National Aniline Division, Allied Chemical Corp.**
Asbestol—Calcium carbonate extender pigments. **Carbola Chemical Company**
ASP—Extender pigments, aluminum silicate. **Minerals & Chemical Corp. of America**
ASRA—Three-roller ointment mills. **Chemical and Pharmeceutical Industry Co., Inc.**
Atlac—Polyester Alkyd Resins. **Atlas Powder Company**
Atlas—Dry colors. **H. Kohnstamm & Co., Inc.**
Attaclay—Finely powdered fullers earth. **Minerals & Chemicals Corp. of America**
Attasol—Colloidal fullers earth. **Minerals & Chemicals Corp. of America**
Attasorb—Fullers earth. **Minerals & Chemicals Corp. of America**
Aulabrite—Water dilutable color emulsions. **Aula Chemicals, Inc.**
Auto-Klean—All metal edge type filter. **The Cuno Engineering Corp.**
AYAA, AYAC, AYAF, AYAZ—Vinyl acetate resins. **Union Carbide Plastics Co.**
AZO—Zinc Oxide pigments; lead-free and leaded. **American Zinc Sales Company**

B

Bahama Blue — Phthalocyanine blue pulps. **Standard Ultramarine & Color Co.**
Bakelite—Vinyl, polyethylene, phenolic and epoxy resins, emulsions and solutions. **Union Carbide Plastics Co.**

Barber Gilsonite—Hydrocarbon resins. **American Gilsonite Co.**
Barden—Kaolin. **J. M. Huber Corp.**
Baryta White—99% $BaSO_4$ white barytes. **DeLore Div., National Lead Co.**
BCU—Urea resins. **Union Carbide Plastics Co.**
Beckacite—Modified Phenolic resins. **Reichhold Chemicals, Inc.**
Beckamine—Urea-formaldehyde resins. **Reichhold Chemicals, Inc.**
Beckopol—Modified phenolic resins. **Reichhold Chemicals, Inc.**
Beckolin—Synthetic drying oils. **Reichhold Chemicals, Inc.**
Beckosol—Pure and modified alkyd resins. **Reichhold Chemicals, Inc.**
Beetle—Urea-Formaldehyde Resins. **American Cyanamid Company**
Benthal—Polyhydric alcohol. **Monsanto Chemical Company**
Bentone—Gelling Agents. **National Lead Co.**
Benzoflex—Chemical Plasticizers. **Tennessee Products & Chemical Corporation**
Benzo Sol—Light Naphtha. **Shell Oil Company**
Big-M-Gel—Long oil liquid gel. **Adco Chemical Co.**
BKR—Lump phenolic resin. **Union Carbide Plastics Co.**
BKS—Phenolic baking solutions. **Union Carbide Plastics Co.**
Black Pearls—Pelleted channel carbon blacks. **Godfrey L. Cabot, Inc.**
Black Shield—Pigment dispersions. **Carbon Dispersions, Inc.**
Blancol—Anionic dispersant. **Antara Chemicals**
B. M. G.—Long oil liquid gel. **Adco Chemical Company**
Boroterm—Highly soluble borate composition for fire resistant water-base paints. **American Potash & Chemical Corp.**
Boxeal—Case sealing glue. **Morningstar-Paisley, Inc.**
BRC—Resinous hydrocarbon plasticizer. **Plastics and Coal Chem. Div., Allied Chem. Corp.**
BR Castor Oil—Bleached, refined raw castor oil. **Pacific Vegetable Oil Corp.**
Bruji—Emulsifiers; polyoxyethylene lauryl ethers. **Atlas Powder Company**
Bronoco—Aliphatic and aromatic petroleum solvents. **The R. J. Brown Company**
BRS—Polyester resins. **Bakelite Company**
Buckeye Pro-Cote—Protein thickener-stabilizer. **The Buckeye Cotton Oil Company**
Buckeye Protein—Protein thickener-stabilizer. **The Buckeye Cotton Oil Company**
Bufen 30—Preservative. **Buckman Laboratories, Inc.**
Bufenoleate 30—Preservative. **Buckman Laboratories, Inc.**
Bulls Eye Brand—Shellac gums. **William Zinsser & Co., Inc.**
Burnok—Thixotropic paint vehicles. **Fred'k. A. Stresen-Reuter, Inc.**
Burnok—Thixotropic vehicles. **T. F. Washburn Company**
Burtonite—Guar Seed Gum. **The Burtonite Co.**
Burundum—Grinding media. **The U. S. Stoneware Company**
Butaprene—Paint latex. **The Firestone Plastics Company**
Butarez—Petroleum hydrocarbon resin. **Phillips Petroleum Company**
Butrol—Preservative. **Buckman Laboratories, Inc.**
Butvar—Polyvinyl butyral resin. **Shawinigan Resins Corporation**
BV—Oil-modified Alkyd. **Basic Varnish & Research Corp.**
BVA—Oil-modified Alkyd. **Basic Varnish & Research Corp.**

C

Cabarose Red—B.O.N. maroon. **B. F. Goodrich Chemical Co.**
Cab-o-lite—Wollastonite. **Godfrey L. Cabot, Inc.**
Cab-o-sil—Colloidal Silicon dioxide. **Godfrey L. Cabot, Inc.**
Caddy Red Toner R-6222—Pyrazolone reds. **B. F. Goodrich Chemical Co.**
Cadmolith—Cadmium red and yellow lithipones. **The Glidden Company**
Calciconter Oil—Bodied Vegetable oil. **Pacific Vegetable Oil Corp.**
Calex—Emulsion Vehicle. **California Ink, Co., Inc.**
Calinate—Calcium soaps. **The Harshaw Chemical Company**
Calkyd—Alkyd Vehicle. **California Ink Co. Inc.**
Calo—Dipentene, pine oil, pitch. **John H. Calo Co.**
Cal-Vyn—Polyvinyl acetate emulsion. **Calvert-Mount Winans Co.**
Calwhite—Calcium carbonate pigment. **The Georgia Marble Co.**
Carbitol—Solvent. **Union Carbide Chemicals Co.**
Carbium—Precipitated calcium carbonate. **Diamond Alkali Co., Silicate-Detergent-Calcium Div.**
Carbo Blue—Iron blue dispersions. **Kentucky Color & Chemical Company**
Carbolac—Channel carbon blacks. **Godfrey L. Cabot, Inc.**
Carbopol—Water sensitive gum, paint thickener. **B. F. Goodrich Chemical Company**
Carbose—Sodium Carboxymethylcellulose. **Wyandotte Chemicals Corp.**
Cargillon—Polyester resins. **Cargill, Inc.**
Cargolis—Fish oil based oils for barn paints. **Cargill, Inc.**
Cascoloids—Latex Stabilizers. **The Borden Company**
Castorwax—Waxlike, hydrogenated castor oil. **Baker Castor Oil Co.**
Castung—Dehydrated castor oil. **Baker Castor Oil Co.**
C-D-M—Centrifugally Cast Dual Metal Rolls. **J. H. Lehmann Co., Inc.**
Celanese CL—Polyvinyl acetate emulsions. **Celanese Corporation of America.**
Celanese Solvent—Solvent. **Celanese Corporation of America**
Celite—Extender pigment, diatomaceous silica. **Johns-Manville Products Corp.**
Cellolyn—Abitol-derived alkyds and modified pentaerythritol esters of rosin. **Hercules Powder Company**
Cellosize—Hydroxyethyl Cellulose. **Carbide and Carbon Chemicals Co.**
Cellosolve—Solvent. **Carbide and Carbon Chemicals Company**
Century Colors—Vat colors. **Kentucky Color & Chemical Co.**
Century Red, Orange, Blue—Indanthrone colors. **Kentucky Color & Chemical Company**
Cerulean Blue—Cobalt pigment. **Harshaw Chemical Co.**
Charlotte—Colloid Mill. **Chemicolloid Laboratories Inc.**
Chembine—Ester of polyalcohol. **Naftone, Inc.**
Chempol—Resins. **Freeman Chemical Corp.**
Chemstor—Glass lined storage tanks. **The Pfaudler Company**
Cherokee—Kaolin Clay. **R. T. Vanderbilt Co.**
Chlorowax 40—Plasticizer; liquid chlorinated paraffin. **Diamond Alkali Company**
Chlorowax 70—Resinous chlorinated paraffin. **Diamond Alkali Company**
Cicoil—Oiticica oil-**Brazil Oiticica, Inc.**
Cidao—Oiticica and castor oils. **Brazilian Industrial Oils, Inc.**
Citation Red—Permanent red 2-B, BON type. **Kentucky Color & Chemical Company**
Citro Deodorant—Paint deodorant. **Florida Molasses Corporation**
Citroflex—Citric acid ester plasticizers. **Chas. Pfizer & Co., Inc.**
CKR—Heat and non-heat hardening phenolic resins. **Union Carbide Plastics Co.**
CKV—Phenolic dispersions. **Union Carbide Plastics Co.**
Claw—Mixing Propeller. **Craddock Equipment Co., Inc.**
Clearate—Lecithin. **W. A. Cleary Corp.**
CMC—Sodium carboxymethylcellulose. **Hercules Powder Company**
Coacetateblak—Carbon black cellulose acetate chips. **Columbian Carbon Co.**
Coacrylateblak—High color carbon black. **Columbian Carbon Co.**
Cobalt 254—Loss of dry inhibitor. **Nuodex Products Company, Inc.**
Cobalt Blue PN922—Cobalt aluminate. **The Harshaw Chemical Co.**
Coblac—Carbon black nitrocellulose dispersions **Columbian Carbon Co.**
Codispersion—Carbon black dispersions in various vehicles. **Columbian Carbon Co.**
Coethloblak—Black chip of dispersed carbon black in ethyl cellulose. **Columbian Carbon Co.**
Cofar—Acrylic-vinyl latex. **Farnow, Inc.**
C-Oil—Hydrocarbon drying oil. **Enjay Company, Inc.**
Cold-Pro—Bleached Shellac. **Acme Shellac Products Company**
Coloidex—Surface treated carbon blacks. **Columbian Carbon Co.**
Color trend—Universal dispersions. **California Ink, Co., Inc.**
Common Sense—Disc filter. **Filpaco Industries**
Concord—Wet ground mica. **Concord Mica Corp.**
Concord Maroon—Deep BON Maroon. **Standard Ultramarine & Color Company**
Conoco—Petroleum solvent. **Continental Oil Co.**
Continental—Carbon Blacks. **Witco Chemical Company**
Continental—Kaolin Clay. **R. T. Vanderbilt Company**
Continex—Furnace carbon black. **Witco Chemical Company**
Coors—High density grinding media. **LZP Industrial Ceramics**
Coresin blak—Black paste. **Columbian Carbon Co.**
Cosden—Solids. **Cosden Petroleum Corp.**
Cosden Polyvis—Polybutene. **Cosden Petroleum Corp.**
Cosol—High-flash naphtha. **Neville Chemical Company**
Covarnish blak—Dry powders. **Columbian Carbon Co.**
Covertex—Vehicles for emulsion paints and latex. **McCloskey Varnish Company**
Covinylblak—Dry chips. **Columbian Carbon Co.**
Cowles—Mixers. **Morehouse-Cowles Inc.**
CP Toluidine Maroon MT-1—Toluidine maroons. **B. F. Goodrich Chemical Co.**
CP Toluidine Toner RT-1—Toluidine reds. **B. F. Goodrich Chemical Co.**
CRCO—**New Way**—Labeling and packaging machines. **Chisholm-Ryder Co. of Pennsylvania**
Crillicon—Acrylic Emulsion. **Jersey State Chemical Co.**
Crosby—Maleic modified ester resin. **Crosby Chemicals, Inc.**
Crypton ZS—Zinc sulfide. **New Jersey Zinc Co.**
Crystal O—Castor Oil. **Baker Castor Oil Co.**
CTLA—Heat-reactive, aromatic-type olefinic hydrocarbon polymer. **Enjay Company Inc.**
Cumar—Paracoumarone-indene resins. **Plastics &Coal Chemical Div., Allied Chemical Corp.**
Cunilate—Fungicides. **Scientific Oil Compounding Company, Inc.**
Cunimene—Fungicides. **Scientific Oil Compounding Company, Inc.**
Cuprous Oxide—Anti-fouling copper pigment. **The Glidden Co.**
Cyan Blue—Phthalocyanine blue. **American Cyanamid Co., Pigment Div.**
Cyanegg—Sodium cyanide. **E. I. du Pont de Nemours & Company, Inc.**
Cyanogum—Gelling agent. **American Cyanamid Co., Commercial Development Div.**
Cyaqua—Alkyd emulsion. **American Cyanamid Co., Plastics and Resin Div.**
Cyclodex—An emulsifiable cobalt catalyst. **Nuodex Products Company, Inc.**
Cyclo Sol—Aromatic Solvents. **Shell Oil Company**
Cyclowhirl—Portable mixer. **The Kwerel Co.**
Cycolac—Styrene copolymer resin. **Marbon Chemical Division**
Cycopol—Copolymer Resins. **American Cyanamid Company**
Cykel—Dicyclopentadiene treated vegetable oil. **Spencer Kellogg & Sons, Inc.**
Cykelin—Dicyclopentadiene treated linseed oil. **Spencer Kellogg & Sons, Inc.**
Cykelsoy—Dicyclopentadiene treated soybean oil. **Spencer Kellogg & Sons, Inc.**
Cymel—Alkylated melamine-formaldehyde resins. **American Cyanamid Co.**
Cyzac—Hard resin. **American Cyanamid Co. Plastics and Resins Div.**
C-8—Epoxy resins. **Union Carbide Plastics Co.**
C-10—Emulsion additive. **Apex Chemical Co.**
C-12—Resin for emulsions. **Farnow, Inc.**

D

D.E.R.—Epoxy resins. **Dow Chemical Co.**
D-Gel—Viscosity controller. **Degen Oil & Chemical Co.**
Dag—Colloidal graphite dispersions. **Acheson Colloids Company**
Dapon—Diallyl phthalate prepolymer. **Ohio-Apex Division**
Darasol—Non-flammable vehicle for aerosol application. Chlorinated Products Div., **Diamond Alkali Co.**
Darex Copolymer—Styrene Butadiene Copolymer. **Dewey & Almy Chemical Co.**
Darex D10P—Chemical Plasticizers. **Dewey & Almy Chemical Company**
Darex Everflex—Polyvinyl Acetate emulsion. **Dewey & Almy Chemical Company**
Darsol—Metal cleaner. **Decar Chemical Products Company**
Darvan—Dispersing Agents. **R. T. Vanderbilt Company**
Davenite—Water ground mica. **Hayden Mica Company**
Daxad—Dispersing Agent. **Dewey & Almy Chemical Co.**
Day—Mixers and roll mills. **J. H. Day Co.**
Drapex—Epoxy stearate plasticizer. **Argus Chemical Corp.**
Defoamer ED—Anti-Foam Agent. **El Dorado Oil Works**
Defoma—Anti-foaming agent. **Scher Bros.**
Dehydol—Nonionic surface active agent. **Failek Products Company, Inc.**
Dehydrol—Dehydrated Castor Oil. **The Sherwin-Williams Co.**
DEO Oil—Deodorized fish oil. **Pacific Vegetable Oil Corp.**
Deodorized Apco—Deodorized aliphatic hydrocarbon thinner. **Anderson-Prichard Oil Corp.**
Deoxidine—Metal cleaners and rust removers. **American Chemical Paint Company**
Detrex 79—Cleaner & phosphate treatment for steel. **Detrex Corporation**
D.G.—Magnesium Silicate. **Tamms Industries, Inc.**
Diamond K—Oxidized oils. **Spencer Kellogg & Sons, Inc.**
Dianol—Insecticide additive. **Dianol Div. Mills-Pearson Corp.**

Dicalite—Diatomaceous Silica extender pigment. **Great Lakes Carbon Corporation**

Dicom—Dipentene. **Newport Industries, Inc.**

Dinopol—Plasticizer. **Ohio-Apex Division**

Dipentek—Dipentaerythritol technical. **Heyden Chemical Corporation**

Dipentene No. 122—Solvent—51% dipentene with other terpene hydrocarbons. **Hercules Powder Company**

DiscPerser—Mixer. **Herman Hockmeyer & Co.**

Dispersa Gen—Soy dispersing agent. **General Mills, Inc.**

Disperse—Aqueous phase dispersant. **Raybo Chemical Company**

Disperso—Wettable metallic stearates. **Witco Chemical Company**

Dispersol—Insecticide base. **Shell Oil Company**

Dixie Perfecto—Carbon Black. **United Carbon Company, Inc.**

Dixie Reds—Toluidine and Para Substitutes. **Standard Ultramarine & Color Company**

DMT—Dimethyl terephthalate. **Hercules Powder Company**

Doubl—Limed wood rosin. **Newport Industries, Inc. Div. of Heyden-Newport Chem. Corp.**

Doubletite—Round friction top paint cans. **American Can Co.**

Dow Corning—Silicones. **Dow Corning Chemical Co.**

Dow Latex—Emulsion of either vinyl chloride, vinylidene chloride copolymer, styrene-butadiene copolymer, or polyvinylidene chloride. **The Dow Chemical Company**

Dowicides—Industrial germicide & fungicides. **Dow Chemical Company**

Drarex—Plasticizer. **Argus Chemical Corp.**

Dresinate—Surface active sodium and potassium salts of rosins and tall oil. **Hercules Powder Company**

Dri-Film—Silicone water-repellents. **General Electric Co.**

Drisoy—Treated soybean oil. **Spencer Kellogg & Sons, Inc.**

Duol—Resinated Lithol Rubine pigment. **E. I. du Pont de Nemours & Company, Pigments Dept.**

Duoreens—N-Alkyl Trimethylene diamines. **Armour Chemical Div.**

Duplex Disperser—Mixer disperser. **Troy Engine & Machine Co.**

Duplicane #517—Sugar cane wax. **Warwick Wax Company, Inc.**

Duraplex—Phthalic alkyd resins. **Rohm & Haas Company**

Duratone Reds—Toluidine and Para Substitutes. **Standard Ultramarine & Color Company**

Durez—Phenol-formaldehyde resins. **Durez Plastics & Chemicals, Inc.**

Dur Osyn—Isophthalic alkyd. **Specialty Resin Co.**

Duroxon—Soft Waxes. **Dura Commodities Corporation**

Dustex Micro-Silica—Soft amorphous silica. **Tamms Industries, Inc.**

Dutch Boy—Pigments—antimony oxide, calcium carbonate, barytes, white lead, red lead, litharge, linseed oils, chemical plasticizers. **National Lead Company**

Dutrex—Rubber plasticizers, softeners and extenders. **Shell Oil Co.**

Dryolene—Aliphatic petroleum thinner (VM&P). **Anderson-Prichard Oil Corporation**

Dyal—alkyd resin. **The Sherwin-Williams Co.**

Dylan—Polyethylene. **Koppers Company, Inc.**

Dylex K-34—Styrene butadiene latex. **Koppers Company, Inc.**

Dymal—Maleic resin. **The Sherwin Williams Co.**

Dymerex—Dimerized wood rosin. **Hercules Powder Company**

Dypenite—Modified phenolic resin. **The Sherwin-Williams Co.**

Dyphene—Phenolic resin. **The Sherwin-Williams Co.**

Dyphos—Stabilizers for vinyls. **National Lead Company**

E

Eagle-Picher—Lead and Zinc Pigments. **The Eagle Picher Company**

Easy Ride—Conveyors. **Filpaco Industries**

EGD—Acrylic Monomer. **American Monomer Corporation**

EHEC—Ethylated hydroxethyl cellulose. **Hercules Powder Company**

EKS, EKR, ERL—Epoxy resins. **Union Carbide Plastics Co.**

Elastex 40-P—Butyl iso decyl phthalate plasticizer. **Barrett Division**

Eldo—Fatty acids. **El Dorado Oil Works**

Electro-Vapor—Dowtherm Kettles. **Blaw-Knox Co.**

Elf—Channel carbon blacks. **Godfrey L. Cabot, Inc.**

Elftex—Oil furnace carbon blacks. **Godfrey L. Cabot, Inc.**

Elvacet—Polyvinyl acetate emulsion. **E. I. du Pont de Nemours & Company**

Elvadex—Vinyl acetate copolymer. **E. I. du Pont de Nemours & Company**

Elvanol—Polyvinyl alcohol resin. **E. I. du Pont de Nemours & Company**

Emco—Ball mills, pebble mills, unitized agitator drives. **Epworth Manufacturing Co.**

Emcol H-50A—Hydrocarbon Solvent Emulsifier. **The Emulsol Corporation**

Emerox—Dibasic acids. **Emery Industries, Inc.**

Emersol—Fatty acids made by selective solvent separation. **Emery Industries, Inc.**

Emery—Vegetable fatty acids. **Emery Industries, Inc.**

Emfac—Monobasic acids. **Emery Industries, Inc.**

Empol—Polymerized fatty acids. **Emery Industries, Inc.**

Emulphor—Nonionic surfactant. **Antara Chemicals Div of Gen'l Aniline & Film Corp.**

Epi-Rez—Pure epichlorohydrin bisphenol resins. **Jones-Dabney Company**

Epi-Tex—Oil modified epichlorohydrin bisphenol resins. **Jones-Dabney Company**

Epi-Var—Oil modified epichlorohydrin bisphenol resins. **Jones-Dabney Company**

Epocast—Epoxy resins. **Furane Plastic, Inc. Sons, Inc.**

Epolene—Polyethylene waxes. **Eastman Chemical Prods., Inc.**

Epon—Epoxy resins. **Shell Chemical Corp.**

Epotuf—Epoxy resins. **Reichhold Chemicals, Inc.**

ERCO Brown—Concentrated brown iron oxides. **Reichard-Coulston, Inc.**

Espesol—Aromatic, aliphatic and intermediate solvents. **Eastern States Chemical Corp.**

Eskol—Refined linseed oil. **Spencer Kellogg & Sons Inc.**

Esso—Aliphatic petroleum solvents. **Esso Standard Oil Company**

Ester Gum 8D and 8L—Glycerol esters of pale wood rosin. **Hercules Powder Company**

Estynox—Epoxidized fatty ester plasticizers. **Baker Castor Oil Co.**

Ethocel—Ethyl Cellulose resins. **The Dow Chemical Company**

Ethofats—Surface active agents. **Armour Co., Chemical Division**

Ethomeens—Surface active agents. **Amour Co., Chemical Company**

Ethomids—Surface active agents. **Armour Co., Chemical Division**

Euston White Lead—Basic carbonate of lead. **The Glidden Co.**

EVT-50—Styrene butadiene latex. **Cargill, Inc.**

EXBC—Polyvinyl Ethyl ether polymer. **Union Carbide Plastics Co.**

EXBM—Polyvinyl ethyl ether polymer. **Union Carbide Plastics Co.**

Excelsior—Carbon Black pigment. **Columbian Carbon Company**

Exkins—Volatile anti-oxidant. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Exon—Vinyl & Styrene Resins. **Firestone Plastics Company**

Extra Fine—Aluminum pastes and powders. **Silberline Mfg. Company, Inc.**

F

FA—Alkyds. **Farnow, Inc.**

FA—Furfuryl alcohol. **The Quaker Oats Co.**

Fade-Ometer—Sunfastness Testing Machine. **Atlas Electric Devices Company**

FAFL—Flat Alkyd Vehicle. **Farnow, Inc.**

Falk Soybean Oils—Soybean oils, (raw, bodied, blown, kettled and specialty). **Cargill, Inc.**

Falkidine—Hard drying fish oils. **Cargill, Inc.**

Falkolin—Linseed oils, (raw bodies, blown, kettled and specialty). **Cargill, Inc.**

Falkomast—Fish and soybean oils specially processed for caulking compounds. **Cargill, Inc.**

Falklore—Esterified tall oils. **Cargill, Inc.**

Falkosoy—Maleinized soybean oils. **Cargill, Inc.**

Falkote—Maleic ester gums. **Cargill, Inc.**

Falkovar—Fish oils (raw, bodied, blown kettled and specialty). **Cargill, Inc.**

Falkowood—Maleinized linseed oils and fish oils. **Cargill, Inc.**

Falkyd—Oil modified alkyd resins. **Cargill, Inc.**

Fanchon Yellow—Hansa Yellows. **B. F. Goodrich Chemical Co.**

Faqd—Medium Oil length alkyd. **Farnow, Inc.**

Farac—Tall oil fatty acid. **Farac Oil & Chem. Co.**

Fastolux—Phthalocyanine green or blue toner. **Ansbacher-Siegle Corp.**

Fast Yellow—Yellow pigment. **R-B-H Dispersions.**

Fatchemco-O—Emulsifier. **Universal Chemicals Corporation**

Fax—Alkyd flat vehicle. **Farnow, Inc.**

FCD—Alkyd, phenolic, natural resins. **France, Campbell & Drying, Inc.**

FEGO—Enamel vehicle. **Farnow, Inc.**

Feon—Epoxy ester. **Farnow, inc.**

Fer 3—Alkyd for emulsion and latex paints. **Farnow, Inc.**

Filmex—Solvent. **U. S. Industrial Chemicals Co.**

Fine—Organic dry color. **Sandoz, Inc., Fine Color Div.**

Flexac—Emulsion polymer. **Colton Chemical Co.**

Flexbond—Polyvinyl acetate emulsion. **The Colton Chemical Company**

Flexol—Plasticizers. **Union Carbide Chemicals Co.**

Flexowax C—Synthetic wax; anti-mar agent for lacquers. **Glyco Products Company, Inc.**

Flexricin—Castor oil—derived plasticizers. **Baker Caster Oil Co.**

Flextal—High rosin, non-crystallizing distilled tall oil. **Farac Oil & Chem. Co.**

Flexwall—Phthalic alkyd flat wall tall oil vehicle. **Farac Oil & Chem. Co.**

FloInducer—Levelling agent. **Raybo Chemical Company**

Flomax—Stabilizer. **National Lead Co.**

Florence—French Process Zinc Oxide. **New Jersey Zinc Company**

Flow-Master—Homogenizer. **Marco Company, Inc.**

Foamex—Liquid defoaming agent. **Glyco Products Company, Inc.**

Foamtrol—Anitfoam Agent. **Arlen Chemical Corp.**

Fo-Glo—Rosin gloss oil. **Newport Industries Co., Div. of Heyden-Newport Chem. Corp.**

F-O-M—Float-O-Matic control of rolls. **J. M. Lehmann Company, Inc.**

Formcels—Formaldehyde solutions. **Celanese Corporation of America**

Formvar—Polyvinyl formal resin. **Shawinigan Resins Corporation.**

Fosbond—Phosphate coating and rust-proofing compound. **Pennsalt Manufacturing Company**

Fosfo—Limed wood rosin. **Newport Industries, Inc.**

Foster—Rotary Pumps. **Foster Pump Works, Inc.**

Fotocol—Proprietary Solvent. **Commercial Solvents Corporation**

FR-28—Sodium Borate, fire retardant. **Pacific Coast Borax Company**

Franklin—Pulverizers. **Franklin P. Miller & Son, Inc.**

Futura—Ball and pebble mill. **Patterson Foundry & Machine Co.**

G

Gafite—Polymethyl alphachloroacrylate. **General Aniline & Film Corp.**

Gamaco—Calcium carbonate pigment. **The Georgia Marble Co.**

Gamakal—Calcium carbonate pigment. **The Georgia Marble Co.**

Gelva—Polyvinyl acetate resins. **Shawinigan Resins Corporation**

Gelvatol—Polyvinyl acetate emulsions. **Shawinigan Resins Corporation**

Genamid—Co-reactants for epoxy resin. **General Mills, Chemical Div.**

Gen-Flo—Styrene butadiene emulsion. **The General Tire & Rubber Company**

Genesol #2, #6—Terpene solvent. **Newport Industries Co. Div. of Heyden-Newport Chem. Corp.**

Genetron—Aerosol propellant. **General Chemical Div., Allied Chemical & Dye Corp.**

Geon Latex—Polyvinyl chloride emulsions. **B. F. Goodrich Chemical Company**

Geon Resin—Polyvinyl chloride resins. **B. F. Goodrich Chemical Company**

GGP Aluminum Extra Brilliant—Flake Aluminum Powder. **U. S. Bronze Powder Works, Inc.**

Glaurin—Grinding aid and dispersing agent. **Glyco Products Company, Inc.**

Globlak—Carbon black—nitrocellulose chip. **Columbian Carbon Co.**

Glomax—Calcined clays. **Georgia Kaolin Co.**

Glycosperse—Emulsifying agent. **Glyo Products Co.**

Glyptal—Alkyd resins. **Archer-Daniels-Midland Co.**

G.N.S. #5—Pine Oil. **Newport Industries Co. Div. of Heyden-Newport Chemical Corp.**

Go Getter—Electric lift truck. **Revolvator Co.**

Gold Bond "R" Silica—Amorphous Silica. **Tamms Industries, Inc.**

Gold Drops—Gold dispersions for lacquers. **B. F. Goodrich Chemical Co.**

Good-Rite—Salts of polacrylic acid. **B. F. Goodrich Chemical Co.**

GPF—Containers. **Geuder-Paeschke & Frey Co.**

Grandodraw—Zinc-phosphate coating chemicals for cold-forming. **Amchem Products, Inc.**

Granodine—Zinc-phosphate coating chemicals for bonding paint to steel. **American Chemical Paint Company**

Green-Pond—Lightfast yellow pigment. **E. I. du Pont de Nemours & Co., Inc., Pigments Dept.**

Grellow—Special lead chromate for green. **Kentucky Color & Chemical Company.**

Grip-Tight—Labeling Paste. **Morningstar-Paisley Products, Inc.**

Groco—Fatty acids. **A. Gross & Company**

GRP—Shellacs. **Gillespie-Rodgers-Pyatt Co. Inc.**

Gulf—Aliphatic petroleum solvents. **Gulf Oil Corporation**

Guyandot Red Toners—Toluidine Substitutes. **Standard Ultramarine & Color Company**

H

Half-second Butyrate—Cellulose acetate butyrate resin. **Eastman Chemical Products, Inc.**
Halowax—Chlorinated naphthalene waxes. **Union Carbide Plastics Co.**
Harflex—Plasticizers. **Harchem Division Wallace & Tiernan**
Harshaw-V—Vinyl Stabilizers. **The Harshaw Chemical Company**
HB-20, 40—Alkyl-aryl type plasticizers. **Monsanto Chemical Company**
Heliogen—Phthalocyanine blue and green pigments. **General Dyestuff Corp.**
Helix—Limed wood rosin. **Newport Industries, Inc.**
Hercoflex—Chemical plasticizers. **Hercules Powder Company**
Hercolyn—Hydrogenated methyl ester of rosin. **Hercules Powder Company**
Hetron—Polyester resins. **Hooker Electrochemical Company**
Hexogen—Paint driers. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Hi-Brite—Fluorescent products. **Shannon Luminous Materials Co.**
Hi-fax—Polyethylene coating. **Hercules Powder Co.**
Hifos—Limed wood rosin. **Newport Industries, Inc.**
HiSolv Solvents—Petroleum Aromatic solvents. **Pennsylvania Industrial Chemical Corp.**
HiWhite—Airfloated Georgia kaolinite. **J. M. Huber Corp.**
Horse Head—Zinc pigments. **New Jersey Zinc Company**
HR Cobalt 254—A cobalt "feeder" drier. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**
HTS—Basic Carbonate White lead. **National Lead Company**
Hycryl—Polyacrylate. **UBS Chemical Corp.**
Hydrasperse—Aluminum silicate extender pigment. **J. M. Huber Corp.**
Hydratex—Aluminum silicate extender pigment. **J. M. Huber Corp.**
Hydrofol—Glycerides & fatty acids. **Archer-Daniels-Midland Company**
Hydro-Lock—Conversion unit. **Biach Industries**
Hydro-Magna—A suspension of magnesium hydroxide. **Merck & Co., Inc.**
Hyfac—Hydrogenated fatty acid. **Emery Industries, Inc.**
Hypalon—Methacrylic ester polymers and chlorosulfonated polyethylene elastomer. **E. I. du Pont de Nemours & Company, Elastomers Div.**
Hyprin—Plasticizer, chemical intermediate. **Dow Chemical Co.**
Hydros—Heat-treated wood rosin. **Newport Industries Co., Div. of Heyden-Newport Chem. Corp.**
Hy-R-Speed—Mills. **Hy-R-Speed Inc.**
Hy-Speed—Agitators & Mixers. **Alsop Engineering Corporation**
Hywax—Fatty alcohol. **Werner G. Smith**

I

I Style—Oblong paint can with screw neck or Neuman opening. **American Can Co.**
IAF Compound—Anti-floating agent. **Imperial Paper & Color Corp.**
Iceberg—Aluminum Silicate Pigments. **Burgess Pigment Company**
Igepal—Emulsifiers. **Antara Chemicals**
Igepon—Wetting & dispersing agents. **Antara Chemicals, Div. of General Aniline & Film Corp.**
Imperial Colors—Pigments. **Imperial Paper & Color Corp.**
Imperse—Pigment dispersion. **Imperial Paper & Color Corp.**
Impervite—Centrifugal pumps. **Falls Industries, Inc.**
Indo Blue B-1—Indanthrene blues. **B. F. Goodrich Chemical Co.**
Indo Marron MV-6601—Thio Indigoid maroon. **B. F. Goodrich Chemical Co.**
Indopol—Liquid polybutenes. **Indoil Chemical Company**
Indulin 70-GR-S—Coprecipitate of lignin and a butadiene-styrene copolymer. **West Virginia Pulp and Paper Company**
Indusoil—Distilled tall oil. **West Virginia Pulp & Paper Company**
International—Mixers. **International Engineering, Inc.**
Iosol—Spirit soluble dyes. **National Aniline Division, Allied Chem. Corp.**
Iridite—Chromate conversion coatings. **Allied Research Products, Inc.**
Iron Red—Calcined synthetic yellow oxide. **Reichard-Coulston, Inc.**
Iron Yellow—Precipitated pure yellow oxide. **Reichard-Coulston, Inc.**
Irox—Iron oxides. **Reichard-Coulston, Inc.**
Irrathene—Irradiated polyethylene. **General Electric Co.**
Isco Amorphous Silica—Extender pigment, Silica. **Innis, Speiden & Company, Inc.**
Isofoam—Polyisocyanate foaming resin. **Isocyanate Products, Inc.**
Isotron—Propellants and refrigerants. **Pennsalt Chemical Corp.**
Ivo—Bone blacks. **Columbian Carbon Co.**

J

Jaysol—Isopropyl alcohol. **Enjay Company, Inc.**
Jet—Mixers. **Herman Machinery Co., Inc.**
Jet Mill—High speed dispersion mill for liquids. **Patterson Foundry & Machine Company**

K

Kadox—Finest particle size Zinc Oxides. **New Jersey Zinc Co.**
Kady Mills—Dispersion Milling Equipment. **Kinetic Dispersion Corporation**
Kaolinites — Hydrated aluminum silicates. **Georgia-Kaolin Co.**
Kapsol—Plasticizer. **Ohio-Apex Division**
Kaymol—Surface active agent emulsifier, antifoaming agent. **Kraft Chemical Company**
KCC—Talc type extender. **Kraft Chemical Co.**
Kelcosol—Fibrous refined, high viscosity sodium alginate. **Kelco Co.**
Kelecin—Surface active agent. **Spencer Kellogg & Sons, Inc.**
Kel-F—Trifluorochloroethylene polymer. **The M. W. Kellogg Company**
Kellin—Refined linseed oil. **Spencer Kellogg & Sons, Inc.**
Kel-sol—Universal tinting vehicle. **Spencer Kellogg & Sons, Inc.**
Keltex—Granular high viscosity sodium alginate. **Kelco Co.**
Keltrol—Styrenated linseed and soybean oils, vinyltoluene copolymer. **Spencer Kellogg & Sons, Inc.**
Kel-Vi-Tol—Linseed varnish oil. **Spencer Kellogg & Sons, Inc.**
Kel-X-L—Treated linseed oil. **Spencer Kellogg & Sons, Inc.**
Kenflex A—Polymer of aromatic hydrocarbons. **Kenrich Corp.**
Kenite—Extender pigment; diatomaceous earth. **Innis, Speiden & Co., Inc.**
Kneadermaster—Dispersion type mixer. **Patterson Foundry & Machine Company**
Koflex—Plasticizers and defoamers. **Kolker Chemical Corp.**
Kopol—Congo copal resins. **Reichhold Chemicals, Inc.**
Koresin—Condensation product of p-tertiary butyl phenol with acetylene. **General Dyestuff Corp.**
Korp—Soda-treated wood rosin. **Newport Indries, Inc.**
Kosmoiak—Carbon black. **United Carbon Co., Inc.**
Kosmos F-4, BB, 1—Carbon black. **United Carbon Co., Inc.**
KP—Plasticizer. **Ohio-Apex Div.**
KPO—Polymerized linseed oils. **Spencer Kellogg & Sons, Inc.**
Kralastic—Styrene-butadiene resins. **Naugatuck Chemical**
Kreelon—Emulsifying wetting and penetrating agent (Anionic). **Wyandotte Chemicals Corp.**
Kromall—Pigment dispersions. **Kromall Chemical & Dispersions Corp.**
Kroma Reds—Pure precipitated red iron oxides. **C. K. Williams & Co.**
Kronisol—Chemical plasticizers. **Ohio-Apex Div.**
Kronitex—Chemical plasticizers. **Ohio-Apex Div.**
Krumbhaar—Phenolic resins. **Lawter Chemicals, Inc.**
KTPL—Low molecular weight polystyrene resins. **Koppers Company, Inc.**
K.V.O.—Linseed varnish oils. **Spencer Kellogg & Sons, Inc.**

L

Lactol Spirits—An aliphatic naphtha in the toluo evaporation range. **American Mineral Spirits Company**
Laminac—Unsaturated polyester resins. **American Cyanamid Company Plastics & Resins Div.**
Landora—Soda-treated wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**
"L" China Clay—China clay. **Tamms Industries, Inc.**
Lehigh—Leaded zinc oxide. **New Jersey Zinc Company**
Lemac—Polyvinyl acetate. **The Borden Co.**
Lemol—Polyvinyl alcohol. **The Bordon Co.**
Lewisol—Maleic alkyd-modified rosin esters. **Hercules Powder Company**
Lightnin—Mixers. **Mixing Equipment Co., Inc.**
Lignocol—Anti-skinning agent and anti-oxidant. **Heyden Chemical Corporation.**
Ligrene—Crude tall oil substitute. **West Virginia Pulp & Paper Co.**
Ligro—Crude tall oil. **West Virginia Pulp & Paper Company**
Lindol—Low color tricresyl phosphate. **Celanese Corporation of America**
Linoresinate—Tall oil type driers. **The Harshaw Chemical Company**
Linstyrol—Styrenated linseed oil. **Spencer Kellogg & Sons, Inc.**
Liquiflow—Low pressure bulk CO_2. **Liquid Carbonic Corp.**
Lithoform—Zinc phosphate coating chemicals for bonding paint to zinc. **Amchem Products, Inc.**
Lithol Rubine Toners—Lithol rubines. **B.F. Goodrich Chemical Co.**
Lo-Micron—Barytes. **Whittaker, Clark & Daniels, Inc.**
Lo-Odor—Octasol driers. **The Harshaw Chemical Company**
Lorite—Diatomaceous material. **National Lead Company**
LP-2—Polysulfide hydrocarbon resins. **Thiokol Corporation**
LPR-1—Latex additive. **Naftone, Inc.**
Lucite—Methyl methacrylate resin. **E. I. du Pont de Nemours & Company, Polychemicals Dept.**
Lumigraphic colors—Special organic colors fluorescing in daylight or under ultraviolet light. **Imperial Paper and Color Corporation**
Luncor PVC—Polyvinyl chloride valves. **Lunkenheimer Company**
Lustrelith—Lithopone. **Chemical Pigment Co.**
Lustrex—Polystyrene resins. **Monsanto Chemical Company**
Lustrex Latex—Polystyrene emulsion. **Monsanto Chemical Company Plastics Div.**
Lytron—Interpolymer and styrene latices and resins for surface coatings and latex paints. **Monsanto Chemical Co. Plastics Div.**

M

M-50—Lead chromate pigment. **National Lead Co.**
MA 28-18—Vinyl alcohol-acetate resins. **Union Carbide Plastics Co.**
Maglite—Reactive magnesium oxide. **Merck & Co., Inc.**
Magnaflake—Metal Powders and Pastes. **Magna Manufacturing Company, Inc.**
Majestic Yellow—Permanent benzidine yellow. **Imperial Paper & Color Corp.**
Makanol—Unsaturated fatty alcohols. **The Stepan Chemical Company**
Malix 138—Limed wood rosin. **Newport Industries, Inc.**
Mammopol—Modified fish oil. **Pacific Vegetable Oil Corp.**
Mapico—Iron oxide pigments. **Columbian Carbon Company**
Marbon 9200—Styrene copolymer, resin and pigment chips. **Marbon Chemical Div.**
Marco—Unsaturated polyester resin. **Celanese Corp. of America**
Marcothex—Unsaturated polyester. **Celanese Corp. of America**
MarHard—Mar proofing agent. **Raybo Chemical Company**
Mark—Stabilizer. **Argus Chemical Corp.**
Marlex—Polyethylene. **Phillips Petroleum Co.**
Marlin Maroon—Yellowish BON maroon. **Standard Ultramarine & Color Company**
Maroc 6—Limed wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**
Maroon-gold—Transparent durable maroon pigment. **E. I. du Pont de Nemours & Co., Inc.**
Marvinol—Polyvinyl chloride resin. **Naugatuck Chemical Div. of U. S. Rubber Co.**
Maskit #2—Paint deodorant. **Aromatic Products, Incorporated**
M C—Catalyst for unsaturated polyester resins. **Celanese Corporation of America**
M D—Aluminium powders & pastes. **Metal Disintegrating Company Inc.**
M.D.A.—Methylene disalicylic acid. **Heyden Chemical Corporation Div. of Heyden-Newport Chem. Corp.**
Meadol—Lignin. **The Mead Corporation**
Melmac—Melamine-Formaldehyde resins. **American Cyanamid Company Plastics and Resins Div.**
Mercadmolith Reds—Cadmium-Mercury colors. **The Glidden Co.**
Mersolite—Fungicides phenyl mercury salts. **Innis, Speiden & Co., Inc.**
Mert ZT—Fungicide. **Carolina Aniline & Extract Company**
Metalead—Metallic lead flakes. **Metalead Products Corporation**
Metasap—Suspending agent. **Div. of Nopco Chemical Co., Metsap Chem. Co.**
Metasol-57—Bacteriacide, fungicide. **Metalsalts Corp.**
Methac—Methyl acetate-methanol. **The Borden Company**
Methocel—Methyl cellulose. **The Dow Chemical Company**
Methox—Plasticizer. **Ohio-Apex Div.**
Methyl acetone—Methyl acetate-methanol-acetone. **The Borden Company**
Methylac—Methyl acetate solvent. **The Colton Chemical Company**
Methylon—Chemical resistant coating intermediates. **General Electric Co.**
Metso 99—Surface active agents. **Philadelphia Quartz Company**
Micro—Cel—Synthetic calcium silicates. **Johns-Manville**
Micro-Klean—Micronic disposable filter cartridge. **The Cuno Engineering Corp.**
Micro-Mica—Finely ground micronized mica **The English Mica Company**

Micro Stardust—Magnesium silicate. **Tamms Industries, Inc.**

Micro Velva—Calcium carbonate extender pigment. **Carbola Chemical Company**

Midas Gold—Gold pigment. **R-B-H Dispersions**

Mikro—Milling machinery. **Pulverizing Machinery Company**

Mill—Limed wood rosin. **Newport Industries, Inc.**

Miller—Crushers. **Franklin P. Miller & Sons, Inc.**

Milmer—Fungicides. **Monsanto Chemical Co.**

Ming Orange—Molybdate orange. **Kentucky Color & Chemical Company**

Mintrol Spirits—A new mineral spirits with a very mild odor. **American Mineral Spirits Co.**

Mirares—Rosin. **Crosby Chemicals, Inc.**

Mirasol—Alkyd resins. **C. J. Osborn Company**

Mixall Mixers—Claw mixing propellers. **Craddock Equipment Company, Inc.**

Mix Mor—Mixers. **Hy-R-Speed, Inc.**

Macatawa Red Tone—Lithol ruliene pigment **Holland Color & Chemical Co.**

Mod col VD—Synthetic thickener for latex paints. **Nopco Chemical Company**

Mogul—Channel carbon blacks. **Godfrey L. Cabot, Inc.**

Molacco—Carbon black pigment. **Columbian Carbon Company**

Molora Maroon—Light BON maroon. **Standard Ultramarine & Color Company**

Monamine—Surface active agents. **Mona Industries, Inc.**

Monarch—Channel carbon blacks. **Godfrey L. Cabot, Inc.**

Monarch—Copper phthalocyanine blue and green. **Imperial Paper & Color Corp.**

Monochrome Greens—Pigments; co-precipitated phthalocyanine blue and chrome yellow. **Imperial Paper and Color Corporation**

Monastral—Copper phthalocyanine blue and green. **E. I. du Pont de Nemours & Company Pigments Div.**

Monastral Red—Red organic pigment. **E. I. du Pont de Nemours Pigment Div.**

Mondur—Isocyanate. **Mobay Chemical Co.**

Monopentek — Monopentaerythritol. **Heyden Chemical Corporation**

Monoplex—Monomeric ester plasticizers. **Rohm & Haas Company**

Monosulph—Emulsifier for water-based paints. **Div. of Nopco Chemical Co., Metasap Chem. Co.**

Montclair Red—Naphthol red toner. **Ansbacher-Siegle Corp.**

Morehouse—Grinding mills. **Morehouse-Cowles Inc.**

Morningstar—Starches and Dextrines. **Morningstar, Nicol, Inc.**

M-P-A—Heat-stable specialty paint additive. **Baker Castor Oil Co.**

MPL Monomer—Autopolymerizable acrylic monomer. **The Borden Company, Polyco Monomer Dept.**

M R—Unsaturated polyester resins. **Celanese Corporation of America**

MS2—Alicyclic ketone resin. **Howards & Sons Ltd.**

Multicel—Diatomaceous earth. **Tamms Industries, Inc.**

Multiflex—Calcium carbonate extender pigments. **Diamond Alkali Company**

Multron—Polyester. **Mobay Chemical Co.**

Munn—Soda-treated wood rosin. **Newport Industries, Co., Div. of Heyden-Newport Chem. Corp.**

Myverol—High potency distilled monoesters. **Distillation Products Industries**

N

Naccolene Concentrate—Detergent. **National Aniline Division, Allied Chemical Corp.**

Nacconate—Diisocyanates. **National Aniline Division, Allied Chemical Corp.**

Nacconols—Detergents. **National Aniline Div. Allied Chemical Corp.**

Naccosol—Wetting agents. **National Aniline Division, Allied Chem. Corp.**

Naccotan—Dispersing agent. **National Aniline Division, Allied Chemical Corp.**

Nacromer—Pearl essence. **The Mearl Corp.**

Nadic—Dicarboxylic acid. **National Aniline Division, Allied Chemical Corp.**

Nalzin—Stabilizer. **National Lead Co.**

Natural-Shape Media—High density grinding media. **LZP Industrial Ceramics**

Naugatex—Copolymer latex. **Naugatuck Chemical Div., U. S. Rubber Co.**

Nebony—Thermoplastic hydrocarbon resins. **Neville Chemical Company**

Neo-fats—Fatty acids. **Armour Chemical Div.**

Neolyn—Rosin derived alkyd resin. **Hercules Powder Company**

Neo Spectra—Carbon black pigment. **Columbian Carbon Company**

Neosol—Ethyl alcohol proprietary solvent. **Shell Chemical Corporation**

Nestaco—Potato starch. **Morningstar, Nicol Inc.**

Nettco—Agitating equipment. **New England Tank & Tower Company**

Nevillac—Phenol-modified coumarone and alkylated phenols. **Neville Chemical Company**

Nevindene—Coumarone-indene resins. **Neville Chemical Company**

Nevinol—Plasticizing and solvent oils. **Neville Chemical Company**

Nevsolv—Aromatic petroleum solvents. **Neville Chemical Company**

Newport Maroon—Transparent double maroon pigment. **E. I. du Pont de Nemours & Co., Inc. Pigments Dept.**

Newtrex—Special wood rosin. **Newport Industries, Inc. Div. of Heyden-Newport Chem. Corp.**

N-Glo 5&5Y—Rosin gloss oil. **Newport Industries, Inc. Div. of Heyden-Newport Chem. Corp.**

Nildew—Fungicides. **Naftone, Inc.**

Nilskin—Anti-skinning agent. **Naftone, Inc.**

Non-fer-Al—Calcium carbonate extender pigments. **Diamond Alkali Company**

Non-Flocculating Green—Phthalocyanine greens. **B. F. Goodrich Chemical Co.**

Nonic—Surface active agents. **Industrial Div., Pennsalt**

Nonisols—Surface active agent. **Geigy Industrial Chemicals**

Nopco—Anti-foam agents, freeze-thaw stabilizers, wetting agents. **Nopco Chemical Company**

Nopco 1572-R—Polyvinyl acetate emulsion. **Nopco Chemical Company**

Nopcote—Polyamide resins. **Nopco Chemical Company**

Nora—Soda-treated wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**

Norlin—Catalytically polymerized linseed and soybean oils. **Cargill, Inc.**

Normasol—Stabilizers for vinyls. **National Lead Company**

Norvan—Polyvinyl acetate emulsions. **R. T. Vanderbilt Company**

Nox-Rust—Corrosion inhibitor. **Danbert Chemical Co.**

NPA—Semi-alkyd vehicles. **Farnow, Inc.**

Nuact Paste—Lead "feeder" drier. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Naude—Grinding aid. **Nuodex Products Co., Div. of Heyden-Newport Chem. Corp.**

Nuba—Coumarone-indene resins. **Neville Chemical Company**

Nulix-15—Limed polymerized wood rosin. **Newport Industries, Inc.**

Nullapon—Sequestering agents. **Antara Chemicals Div. of Gen'l Aniline & Film Corp.**

Nulskin—Discontinued name for anti-skinning agent. **Raybo Chemical Company**

Nuodex—Fungicides and driers. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nuogel A. O.—Thickening agent. **Nuodex Products Company, Inc. Div. of Heyden-Newport Chem. Corp.**

Nuolates—Tallate driers. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nuomix—Surface active agent. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nuospet—Non-toxic paint preservative. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nuosperse 657—A combination of surface active agents. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nuozene—Sanitizing agent. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nuroz—Polymerized wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**

Nuvis—Bodying agents. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Nyco Super—Phthalocyanine blue and green pigments. **New York Color & Chemical Co.**

Nycolime—Phthalocyanine blue and green pigments. **New York Color & Chemical Co.**

Nylocet—fire-proofing agent. **Scher Bros.**

Nytal—Talc. **R. T. Vanderbilt Company**

O

Octasol—Driers. **The Harshaw Chemical Co.**

Ohopex—Plasticizer. **Ohio-Apex Division**

Oitioil—Oiticica oil. **Brazil Oiticica, Inc.**

OKO—Polymerized linseed oils. **Spencer Kellogg & Sons, Inc.**

Omamid—Polyamide resin. **Olin Mathieson Chemical Corp.**

ONB—Ortho-nitrobiphenyl plasticizer. **Monsanto Chemical Company**

One Point—High speed mills. **Troy Engine & Machine Co.**

Oolitic—Dry milled calcium carbonates. **DeLore Div., National Lead Co.**

OO Silica Smoke—Amorphous Silica. **Tamms Industries, Inc.**

Opalon—Vinyl chloride resin. **Monsanto Chemical Company, Plastics Div.**

Orion Red—Yellowish red pigment. **Pigment, Color and Chemical Div., Sherwin-Williams Co.**

Oronite—Polybutene. **Oronite Chemical Co.**

Orthophen—Amyl phenols for antiskinning. **Industrial Div., Pennsalt**

Orthotone Orange—Ortho-Nitraniline orange. **Standard Ultramarine & Color Company**

Ozlo—Leaded zinc. **The Sherwin-Williams Co.**

P

PUC—Dispersion mill. **Pfaudler Co.**

Paco Solvent TR-590—Proprietary alcohol solvent. **Publicker Industries, Inc.**

Paideos—Paint deodorants. **Dodge & Olcott, Inc.**

Paint Base Oil—Special pigmented base oil. **Pacific Vegetable Oil Corp.**

Paintodors—Paint deodorants. **Sindar Corporation**

Paisflex—Polyvinyl acetate resin paint base (internally plasticized). **Morningstar-Paisley, Inc.**

Paisley—General line of liquid labeling glues. **Morningstar-Paisley, Inc.**

Palconate—Surface active agent. **The Pacific Lumber Company**

Palcotan—Surface active agent. **The Pacific Lumber Company**

Pamak—Tall oil fatty acids. **Hercules Powder Co.**

Panaflex BN—Hydrocarbon plasticizer. **Amoco Chemicals Corp.**

Panapol—Synthetic hydrocarbon drying oils. **Pan American Chemicals**

Panarez—Petroleum hydrocarbon resins. **Amoco Chemicals Corp.**

Panasol—High solvency aromatic solvents. **Amoco Chemicals Corp.**

Paradene—Coumarone-indene resins. **Neville Chemical Company**

Paragon—Kaolin. **J. M. Huber Corp.**

Paraplex—Plasticizers and polyester resins. **Rohm & Haas Company**

Parapol-S—High molecular weight copolymer of styrene and isobutylene. **Enjay Company, Inc.**

Parasepts—Anti-fungal and anti-bacterial agents. **Heyden-Newport Chemical Corporation**

Paricin—Saturated fatty ester plasticizers. **Baker Castor Oil Co.**

Parlon—Chlorinated natural rubber. **Hercules Powder Company**

Pastall—Driers. **The Harshaw Chemical Co.**

Pavoco Oil—Bodied linseed oil. **Pacific Vegetable Oil Corp.**

Pavoil—Bodied oil. **Pacific Vegetable Oil Corp.**

Pavolene—Refined linseed oil. **Pacific Vegetable Oil Corp.**

Pavolin Oil—Bodied linseed oil. **Pacific Vegetable Oil Corp.**

Pavasoy—Bodied soybean oil. **Pacific Vegetable Oil Corp.**

Pavosynth—Modified linseed oil. **Pacific Vegetable Oil Corp.**

Paxwax—Microcrystalline waxes. **National Wax Company**

PC 1244—Defoaming agent. **Monsanto Chemical Company**

PCP Castor Oil—Raw expeller oil, unbleached. **Pacific Vegetable Oil Corp.**

PE—Polyhydric alcohol. **Hercules Powder Co.**

Peerless—Kaolin clay. **M. T. Vanderbilt Co.**

PEFA—Esterified distilled tall oils. **Crosby Chemicals, Inc.**

Penbro—"B" wood resin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**

Penbro 83—Linseed wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**

Penglo 65—Tall oil penta ester solution. **Newport Industries, Inc., Div. of Heyden Newport Chemical Corp.**

Pennco—Pigment dispersions & Chips. **Pennsylvania Color & Chemical Company**

Pennsalt—Metal cleaners, alkaline paint strippers, and paint spray booth water conditioners. **Pennsalt Chemicals Corp.**

Penola—Aliphatic and Aromatic Solvents, Naphthas and Varsols. **Penola Oil Company**

Penros—Polymerized wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**

Pent Acetate—Synthetic amyl acetate. **Industrial Div., Pennsalt Chemicals Corp.**

Pentacite—Pentaerythritol resins. **Reichhold Chemicals, Inc.**

Pentalyn—Pentaerythritol esters of rosin and phenolic-modified pentaerythritol esters of rosin. **Hercules Powder Company**

Pentasol—Synthetic amyl alcohols. **Industrial Div., Pennsalt**

Pentek—Pentaerythritol technical. **Heyden-Newport Chemical Corporation**

Perclene—Perchlorethylene. **E. I. du Pont de Nemours & Co., Inc. Electrochemicals Dept.**

Perma-leaf—Aluminum paste. **Reynolds Metals Co.**

Permachlor Red—Red dry colors. **Sherwin Williams Company**

Permadine—Zinc phosphate coating chemicals for rust-proofing. **Amchem Products Corp.**

Permagel—Processed Fullers Earth thickener. **Minerals & Chemicals Corp. of America**

Permaline Blue—Phthalo Lake. **Whittaker, Clark & Daniels, Inc.**

Permanent—Phthalocyanine blue and green pigments. **New York Color & Chemical Co.**

Permansa—Nitroso naphthol green, chlor-para nitraniline red, and hansa yellow. **The Sherwin-Williams Co.**

Permolith—Lithopone. **The Sherwin-Williams Co.**

Permox—Lead chromate pigment. **Eagle Picher Co.**

Petrex—Unmodified Petrex alkyd resins. **Hercules Powder Co.**

Petro A A—Surface active agent. **Petrochemicals Company**

Petrodor—Paint solvent deodorants. **Dodge & Olcott, Inc.**

Petrohol—Isopropyl alcohol. **Enjay Company, Inc.**

Petrolene—Aliphatic petroleum thinner. **Anderson-Prichard Oil Corporation**

Petrolite—Emulsifiable waxes. **Petrolite Corporation, Ltd.**

Petronauba—Emulsifiable petroleum wax. **Bareco Oil Company**

Petropon—Heavy petroleum polymers. **American Mineral Spirits Company**

Petro-Resins—Polymerized olefinic hydrocarbons. **Petroleum Specialties Company**

Petrosul—Petroleum sulfonate. **Pennsylvania Refining Company**

Petrothene—Polyethylene resins. **U. S. Industrial Chemicals Co.**

Phelate—Crosslinking reagent. **J. S. Ayers Co.**

Phillips 66—Hydrocarbon solvents. **Phillips Petroleum Company**

Phthalo—Phthalocyanine blue and green pigments. **New York Color & Chemical Co.**

Picco—Solvents & Solvent oils. **Pennsylvania Industrial Chemical Corporation**

Piccoflex—Hydrocarbon copolymer resin. **Pennsylvania Industrial Chemical Corp.**

Piccolastic—Low molecular wt. polystyrene resins **Pennsylvania Industrial Chemical Corp.**

Piccolyte—Polyterpene resins. **Pennsylvania Industrial Chemical Corporation**

Piccopale—Petroleum hydrocarbon resin. **Pennsylvania Industrial Chemical Corporation**

Piccopale Emulsion—Petroleum hydrocarbon resin emulsion. **Pennsylvania Industrial Chemical Corporation**

Piccoumaron—Coumarone-Indene resins. **Pennsylvania Industrial Chemical Corporation**

Piper Red—Pyrazalone red. **Ansbacher-Siegle Corp.**

P-K—Twin shell blender. **The Patterson-Kelly Company, Inc.**

Placco-Tex—Latex emulsion. **Borden Chemical Co.**

Planisol—Surface active agent. **The Girdler Company**

Plaskon—Alkyd molding compounds. **Plastics Coal Chemicals, Div. of Allied Chemical Corp.**

Plasticone—Pyrazolone red pigment. **Pigment Color and Chemical Div., Sherwin-Williams Co.**

Plasto—Dyes for plastics. **National Aniline Div. of Allied Chem. Corp.**

Plastoflex—Plasticizers. **Advance Solvents & Chemical Div. of Carlisle Chemical Works Inc.**

Plastolein—Chemical & resinous plasticizers. **Emery Industries, Inc.**

Pliolite latex—Styrene-butadiene emulsions. **The Goodyear Tire & Rubber Co. Inc.**

Pliolite, natural rubber—Cyclized natural rubber. **The Goodyear Tire & Rubber Co. Inc.**

Pliolite S-5—Styrene-butadiene resins. **The Goodyear Tire & Rubber Co. Inc.**

Pliovic—Polyvinyl chloride resins. **The Goodyear Tire & Rubber Co. Inc.**

Plumb-O-Sil—Stablizers for vinyls. **National Lead Company**

Pluronics—Emulsifying agent (nonionic). **Wyandotte Chemicals Corp.**

Plymouth—Stearates. **M. W. Parsons-Plymouth Inc.**

Plyophen—Phenolic resins. **Reichhold Chemicals, Inc.**

PMAC—High boiling solvent-polymethoxy acetal. **General Aniline & Film Corporation**

PMN-10—Fungicide. **Nuodex Products Co., Div. of Heyden-Newport Chem. Corp.**

PMO 10—Fungicide. **Nuodex Products Co., Div. of Heyden-Newport Chem. Corp.**

POE—Modified polyester enamel vehicle. **Farnow, Inc.**

Polycin—Gelled castor oil. **Baker Castor Oil Co.**

Polyco—Resin emulsions. **The Borden Company**

Polyfon—Surface active agents. **West Virginia Pulp and Paper Company**

Polylite—Polyester Resins. **Reichhold Chemicals, Inc.**

Polymekon—Specially processed petroleum wax. **Warwick Wax Company, Inc., Div. of Sun Chemical Corp.**

Polymer C-3—Modified vinyl acetate resin. **Monsanto Chemical Co.**

Polyox—Water soluble resin. **Union Carbide Chemicals Co.**

Poly-pale Ester—Glycerol ester of polymerized rosin. **Hercules Powder Company**

Poly-Solv EE—Lacquer solvent. **Olin-Mathieson**

Poly-Sperse—Plasticizer. **National Polychemicals, Inc.**

Poly-Tex—Polyvinyl acetate copolymer emulsion. **Jones-Dabney Company**

Polytung—Heat treated tung oil. **Degen Oil, & Chemical Co.**

Porox—Grinding balls. **Porcelain Div., Ferro Corp.**

Potters—Reflective spheres. **Potters Brothers, Inc.**

Preventol—Fungicides. **Antara Chemicals Div. of Gen'l Aniline & Film Corp.**

Prgmol—Latex emulsion leveling agent. **Fred'k A. Stresen-Reuter, Inc.**

Propocel—Cellulose derivative. **The Dow Chemical Company**

Protatek 53—Sodium alginate thickener. **Croda Incorporated**

Protectoseal—Equipment for protection against fires through the use of flammable liquids. **Protectoseal Company**

Protovacs—Cascinates. **The Borden Company**

PT—Pine tar, pine tar oil. **Godfrey L. Cabot, Inc.**

Puratized OL-28—Phenylmercury oleate. **Gallowhur Chemical Corporation**

Purecal—Ppt. calcuim carbonate. **Wyandotte Chemicals Corp.**

Putrol—Deodorant. **Fritzsche Brothers, Inc.**

PVC 100—Polyvinyl chloride. **The Dow Chemical Company**

PX Plasticizers—Chemical and Resinous Plasticizers. **Pittsburg Coke & Chemical Co.**

Pycal—Chemical Plasticizers. **Atlas Powder Co.**

Pyrax—Foliated aluminum silicate. **Standard Mineral Corp.**

Pyropel—Fire-proofing agent. **Scher Bros.**

Pyrotone Reds—Chlorinated para toners. **Standard Ultramarine & Color Company**

Q

QO—Furan chemicals & derivatives. **The Quaker Oats Company**

Quindex—Copper-8 quinolinolate solution. **Nuodex Products Co., Inc.**

QYNV—Vinyl chloride and vinyl chloride-acetate resins for dispersion coatings. **Union Carbide Plastics Co.**

R

R-64—Silicone resin for cold blending. **Silicones Div. Union Carbide Corp.**

R-856—Silicone-alkyd resin. **Dow Corning Corp.**

R-878 Resin—Silicone-alkyd resin. **Dow Corning Corp.**

Radiant Yellow—AAOT benzidine yellow toner. **Ansbacher-Siegle Corp.**

Ramapo—Resinated organic pigments. **E. I. du Pont de Nemours & Company, Pigments Dept.**

R & R—Bodying and surface active agents. **Ross & Rowe, Inc.**

Raven—Carbon black pigment. **Columbian Carbon Company.**

R-B-H—Pigment dispersions. **R-B-H Dispersions**

R C Plasticizer E S—Polymeric plasticizer. **Rubber Corporation of America**

RD 910—Stabilizer-thickner. **Minnesota Mining & Manufacturing Company**

Readco—Mixers & materials handling equipment. **Read Standard Corporation**

RECO Brown—Concentrated brown iron oxides. **Reichard-Coulston, Inc.**

Red Diamond—Cylinder gas-CO_2. **Liquid Carbonic Corp.**

Red Giant—Hand lift truck. **Revolvator Co.**

Red Toner (Manganese) R-93—B.O.N. reds. **B. F. Goodrich Chemical Co.**

Regal Yellows—Chrome yellow pigment. **Imperial Paper and Color Corp.**

Repello—Water repellent. **Scher Bros.**

Resimene—Butylated melamine formaldehyde resins. **Monsanto Chemical Company, Plastics Div.**

Resimene-U—Butylated urea formaldehyde resins. **Monsanto Chemical Company Plastics Div.**

Resinox P97—Phenolic resin. **Monsanto Chemical Company**

Resipel—Water repellent. **Scher Bros.**

Resyn—Polyvinyl acetate emulsions. **National Starch Products Inc.**

Resoflex—Plasticizers. **Cambridge Industries, Inc.**

Revolvator—Materials handling equipment. **Revolvator Company**

Rex Orange—Molybdate orange. **Imperial Paper & Color Corp.**

Reynolds Metals—Aluminum Powder & Paste. **Reynolds Metals Company**

Reynolized—Aluminum paste pigment. **Reynolds Metals Company**

Rezamul—Alkyd Emulsions. **Reichhold Chemicals, Inc.**

Rezyl—Oil & resin-modified alkyd resins. **American Cyanamid Company, Plastics & Resins Div.**

Rheotol—Surface active agent. **R. T. Vanderbilt Company**

Rhoplex—Acrylic resin dispersions. **Rohm & Haas Company**

Rhoplex AC-33—Acrylic emulsion. **Rohm & Haas Company**

Rhotex—Emulsified resin. **Rohm & Haas Co.**

Richmond Green Dispersion—Pigment green **Ansbacher-Siegle Corp.**

Roalox—Grinding mill jars. **The U. S. Stoneware Co.**

Rocker-Roll—Drum mixers. **The U. S. Stoneware Co.**

Rodine—Pickling acid inhibitors. **Amchem Products Corp.**

Roller Type—Laboratory mills. **The U. S. Stoneware Co.**

Roman—Manganese-BON pigment. **Kentucky Color & Chemical Co.**

Rotator—Drum truck. **Morse Manufacturing Company, Inc.**

Rotocan—Change-can mixers. **Baker Perkins, Inc.**

Royal Spectra—Carbon blacks. **Columbian Carbon Co.**

Rubanox Red—Lithol Rubine. **The Sherwin-Williams Co.**

Rubine Reds—Organic red pigments. **Imperial Paper & Color Corp.**

Rustib—Corrosion inhibitor. **Raybo Chemical Company**

RV—Flatting paste. **R-B-H Dispersions**

S

SAIB—Sucrose diacetate hexaisobutyrate. **Eastman Chemical Products, Inc.**

Safe-T-Hues—Special non-toxic colorants. **H. Kohnstamm & Company, Inc.**

Safflower 22—Isomerized safflower oil. **Pacific Vegetable Oil Corp.**

Saflex—Polyvinyl butyral. **Monsanto Chemical Company Plastics Dept.**

Sag—Antifoam agent. **Silicone Div., Union Carbide Corp.**

St. Joe—Lead-free zinc oxide. **St. Joseph Lead Company**

Santicizer—Chemical plasticizers. **Monsanto Chemical Company**

Santocel—Extender pigment, silica aerogel. **Monsanto Chemical Company**

Santolite—Aryl sulfonamide-formaldehyde resins. **Monsanto Chemical Company**

Sapona Reds—Soapfast reds. **Standard Ultramarine & Color Company**

Saran—Vinylidene Chloride polymers. **The Dow Chemical Company**

Sarkosyls—Emulsifiers and anti-corrosive agents. **Geigy Industrial Chemicals**

Schercolene—Dispersing agent. **Scher Bros.**

Sea Gull Brand—Ultramarine blue. **Reckitt's England**

Sealed-Disc—Paint filters. **Alsop Engineering Corporation**

Seatone—Flushed colors for water emulsion paints. **Hilton-Davis Chemical Co.**

Sequestrene—Metal complexing agent. **Geigy Industrial Chemicals**

Ser-X—Extender pigment; Sericite (hydrous aluminum silicate). **Innis, Speiden & Co., Inc.**

Shannon-Glow—Black light fluorescent products. **Shannon Luminous Materials Co.**

Shannon Line—Black light lamps. **Shannon Luminous Materials Co.**

Shear-flow—Mixers. **Gabb Special Products**

Shellmax—Micro crystalline waxes. **Shell Oil Company**

Shell Sol—Stoddard solvent. **Shell Oil Company**

Shell wax—Paraffin waxes. **Shell Oil Company**

Sher-Will-Glo—Fluorescent colors. **Sherwin-Williams Co.**

Ship Pitch—Pitch. **Newport Industries, Inc. Div. of Heyden-Newport Chemical Co.**

Sierra Fibrene—Extender pigment; Talc (magnesium silicate). **Innis, Speiden & Co., Inc.**

Sierra Mistron—Extender pigment; Talc (magnesium silicate). **Innis, Speiden & Co., Inc.**

Sight-O-Matic—Paint mills. **J. M. Lehmann Co., Inc.**

Silastic—Silicone rubber. **Dow Corning Corp.**

Silex—Extender pigment; hard silica. **Innis, Speiden & Company, Inc.**

Silvar—Aluminum pastes & powders. **Silberline Mfg. Company, Inc.**

Silver Bond "B" Silica—Crystalline-hard silica. **Tamms Industries, Inc.**

Sinclair—Solvents. **Sinclair Chemicals Inc.**

Skelly solve—Aliphatic hydrocarbon solvents. **Skelly Oil Co.**

Skyline Blue—Phthalocyanine blues. **B. F. Goodrich Chemical Co.**

Smico—Process equipment. **Southwest Mill Industrial Equipment Company**

Smithko—Pigments and extenders. **Smith Chemical & Color Company**

Socal Petrolatum—Waxes. **Standard Oil Co. of California**

Socal Solvent—Aromatic Solvent. **Standard Oil Company of California**

Softex—Blue pigment. **Kentucky Color & Chemical Co.**

Softex Red—Precipitated pure red oxide. **Reichard-Coulston, Inc.**

Solarite—Hydrocarbon resin. **Solar Compounds Corp.**

Sole-Onic CDS—Emulsifier, antifoamer. **Sole Chemical Corp.**

Solfast—Lightfast organic red, phthalocyanine blue. **The Sherwin-Williams Co.**

Solinox—Process linseed oil. **Spencer Kellogg & Sons Inc.**

Solox—Solvent. **U. S. Industrial Chemicals Co.**

Solros—Heat-treated wood rosin. **Newport Industries, Inc.**

Soltrol—Odorless paint solvents & thinners. **Phillips Petroleum Company**

Solvenol—Mixed terpene solvent. **Hercules Powder Company**

Solvent #30—Terpene solvent. **Newport Industries, Inc.**

Solvesso—Aromatic petroleum solvents. **Esso Standard Oil Company**

Solvoflex—Gaskets. **The U. S. Stoneware Co.**

S-O-M—Sight-O-Matic control of roll pressures. **J. M. Lehmann Co., Inc.**

Sorbo—70% sorbitol solution. **Atlas Powder Co.**

Sovasol—Aliphatic petroleum solvents. **Socony-Vacuum Oil Company**

Soya Paint Oil—Modified soybean oil. **Pacific Vegetable Oil Corp.**

Soya Solinox—Process soybean oil. **Spencer Kellogg & Sons Inc.**

Soyates—Soybean driers. **The Harshaw Chemical Company**

Soywood Oil—Co-polymerized combination of refined soybean oil and tung oil. **Pacific Vegetable Oil Corp.**

SP Alizarine Maroon MV-7013—Alizarine maroons. **B. F. Goodrich Chemical Co.**

Span—Emulsifiers; fatty acid esters of sorbito anhydrides. **Atlas Powder Company**

Spangle—Aluminum paint improver. **Raybo Chemical Company**

Sparkler—Horizontal plate filters. **Sparkler Mfg. Co.**

Sparmite—Very fine barium sulfate. **C. K. Williams & Company**

Sparsol—Vinyl type polymer. **Sparta Industries**

SP Blue Toners BT-8—Tungstated blues and violet. **B. F. Goodrich Chemical Co.**

Spectronic 20—Colorimeter. **Bausch & Lomb Optical Company**

Speedee Mite—"Miniature paint factory in a test tube." **Charles E. Barker Company**

Spenkel—Polyurethane. **Spencer Kellogg & Sons Inc.**

Spheron—Channel carbon blacks. **Godfrey L. Cabot, Inc.**

SR—Silicone resins. **General Electric Co.**

Stabelan—Vinyl stabilizers. **Harwick Standard Chemical Company**

Staybelite Ester—Glycerol ester of hydrogenated rosin. **Hercules Powder Company**

Stabilizer D-22—Dibutyl tin dilaurate. **Union Carbide Chemicals Company**

Stamford—Aluminum pastes & powders. **Silberline Mfg. Company, Inc.**

Standard—Zinc dust. **New Jersey Zinc Co.**

Standard Refined Wax—Waxes. **Standard Oil Company of California**

Standard Thinner—Aliphatic thinners. **Standard Oil Company of California**

Standardaire—Blower. **Read Standard Corp.**

Stardust—Magnesium silicate. **Tamms Industries, Inc.**

Statex—Carbon black pigment. **Columbian Carbon Company**

Steelco—Distilled tall oils. **K. A. Steel Chemicals Inc.**

Sterling—Oil and gas furnace and gas thermal carbon blacks. **Godfrey L. Cabot, Inc.**

Stern-Tite—Paint cans. **Stern Can Co., Inc.**

Steveco—Mixers, grinding equipment, tanks, fans, blowers. **The Stevenson Company**

Streako—Metallic Soaps. **W. H. Fales Co.**

Strypp-Away—Liquid paint stripper. **The Du-Bois Company, Inc.**

Stycast—Polystyrene casting resins. **Emerson & Cuming, Inc.**

Stypol—Polyester resins. **H. H. Robertson Co.**

Styresol—Styrenated alkyd resins. **Reichhold Chemicals, Inc.**

Styretex—Styrenated alkyd resins. **Jones-Dabney Company**

Styron—Polystyrene. **The Dow Chemical Co.**

Sunaptic—Naphthenic acids. **Sun Oil Co.**

Sunoco—Solvents. **Sun Oil Co.**

Sunolith—Lithopone. **The Glidden Company**

Sun Yellow—Nickel-titanium dioxide pigment. **The Harshaw Chemical Co.**

Super Ad-It—Fungicide. **Nuodex Products Company, Div. of Heyden-Newport Chem. Corp.**

Super Aetna Crimson Red Oxide—Produced from crude Persian Gulf red oxide. **Reichard-Coulston, Inc.**

Super Ester Gum—Pentaerythritol ester of rosin. **Crosby Chemicals, Inc.**

Super Lacros—Maleic modified rosin esters (glycerol-type). **Crosby Chemicals, Inc.**

Superloid—Granular high viscosity ammonium alginate. **Kelco Co.**

Super Spectra—Carbon black pigment. **Columbian Carbon Company**

Super Three—Roller mills. **Kent Machine Works, Inc.**

Superba—Carbon black pigment. **Columbian Carbon Company**

Super-Beckacite—Pure phenolic resins. **Reichhold Chemicals, Inc.**

Super-Beckamine—Melamine-formaldehyde Resins. **Reichhold Chemicals, Inc.**

Super-Beckosol—Isophthalic Acid Alkyd Resins **Reichhold Chemicals, Inc.**

Super IMperse—Aqueous pigment dispersions. **Imperial Paper & Color Corp.**

Supercarbovar—Channel carbon blacks. **Godfrey L. Cabot, Inc.**

Superflo—Linseed grinding oils. **Spencer Kellogg & Sons, Inc.**

Superfyde—Formaldehyde polymer. **Heyden Newport Chemical Corporation**

Superior—Linseed varnish oils. **Spencer Kellogg & Sons, Inc.**

Superior—Soybean varnish oils. **Spencer Kellogg & Sons, Inc.**

Superjet—Lampblack. **C. K. Williams & Co.**

Super-sol—odorless naphtha. **Pennsylvania Refining Company**

Supreme—Crushers, pulverizers. **Franklin P. Miller & Son, Inc.**

Suprex—Kaolin. **J. M. Huber Corp.**

Surfactol—Surfactant. **Baker Castor Oil Co.**

Surfex—Calcium carbonate extender pigments. **Diamond Alkali Company**

Surfynol—Surface active agent, dispersant, liquid defoamer. **Air Reduction Chemical Co.**

Susnenso—Calcium carbonate extender pigments **Diamond Alkali Company**

Susperse B—Anti-sagging, anti-settling, wetting and dispersing agent. **Raybo Chemical Co.**

Swiveloader—Material handling equipment. **Stephens-Adamson Mfg. Company**

Syloid—Extender pigments; silica. **Davison Chemical Company**

Syl-Kem—Silicone intermediate. **Dow Corning Corp.**

Synco—Phenolic resins. **Snyder Chemical Corp.**

Synco 935-D—Cross-linking vinyl copolymer emulsion. **Snyder Chemical Corporation**

SynPar—Hard, high-melting wax. **H. L. Barnebey**

Syntex—Alkyd resins. **Jones-Dabney Company**

Synthaline Blue—Pure phthalo toner. **Whittaker, Clark & Daniels, Inc.**

Synthe-Copal—Ester gum resins. **Reichhold Chemicals, Inc.**

Synthemul—Alkyd emulsion. **Reichhold Chemicals, Inc.**

Synthenol—Dehydrated castor oil. **Spencer Kellogg & Sons, Inc.**

Syn-U-Tex—Butylated urea formaldehyde resins. **Jones-Dabney Company**

Synvarite—100% phenolic resins. **Synvar Corp.**

Synvarol—Butylated urea resins. **Synvar Corp.**

T

T 1215—Polymerized linseed oils. **Spencer Kellogg & Sons, Inc.**

T24-9—Vinyl alochol-acetate resin. **Union Carbide Plastics Co.**

Tallene—Tall oil pitch. **West Virginia Pulp & Paper Co.**

Tartan Colors—Organic lakes and toners. **Magruder Color Co., Inc.**

Tasco—Talc. **Tamms Industries, Inc.**

T.A.T. Bentonite—Colloidal clay. **Tamms Industries, Inc.**

TBTO—Agcides, fungicides, milderwicides. **Metal & Thermit Corp.**

T. C.—Calcium carbonates. **Tamms Industries, Inc.**

Tecquinol—Technical hydroquinone. **Eastman Chemical Products, Inc.**

Tecsol—Proprietary solvent based on ethyl alcohol. **Eastman Chemical Products, Inc.**

Tenex—Heat-treated wood rosin. **Newport Industries, Inc. Div. of Heyden Newport Chemical Corp.**

Tenn-Sil—Fillers. **Tennessee Products & Chemical Corp.**

Tergitol—Nonionic and anionic surface active agents. **Union Carbide Chemical Company**

Tetronic—Nonionic wetting agent and dispersant. **Wyandotte Chemicals Corp.**

Texaphor—Anti-setting agent. **Fallek Products Co.**

Texapon—Stabilizer and suspension agent. **Fallek Products Co.**

Texas—Pigment blacks. **Sid Richardson Carbon Co.**

Textile Spirits—An aliphatic naphtha having an evaporation range similar to benzol. **American Mineral Spirits Company**

T-Glo-8 & 8Y—Tall oil gloss oil. **Newport Industries, Div. of Heyden-Newport Chemical Corp.**

Thermatomic Black—Special purpose carbon black. **Thermatomic Carbon Co.**

Thermax, P-33—Carbon blacks. **R. T. Vanderbilt Company**

Thermoil-Granodine—Manganese ironphosphate coating chemicals for wear-proofing and rust-proofing. **Amchem Products, Inc.**

Thermolite—Stabilizers for vinyls. **Metal & Thermit Corporation**

THFA—Tetrahydrofurfuryl alcohol. **The Quaker Oats Company**

Thixin—Multi-purpose paint additive. **Baker Castor Oil Co.**

Thoro Blender—Conical dry blender & mixer. **Patterson Foundry & Machine Company, Div. of Ferro Corp.**

Ti-Cal—Titanium calcium pigments. **E. I. du Pont de Nemours & Company Pigments Dept.**

Tipen—Isophthalic tall oil alkyd. **Farac Oil & Chem. Co.**

Tints-All—Universal tinting colors. **Sheffield Bronze Paint Corp.**

Ti-Pure—Titanium dioxide pigments, rutile and anatase. **E. I. du Pont de Nemours & Co. Pigments Dept.**

Titanolith—Titanated lithopone. **The Glidden Company**

Titanox—Titanium dioxide pigments; rutile, anatase, non-pigmentary, titanium calcium. **Titanium Pigment Corporation**

TK—Flatting paste. **R-B-H Dispersions**

TME—Trimethylolethane. **Heyden-Newport Chemical Corporation**

TMP—Trimethylolpropane. **Heyden-Newport Chemical Corporation**

Tolbe—Tall oil pitch. **Newport Industries, Div. of Heyden-Newport Chemical Corp.**

Tolusol—Lacquer diluent. **Shell Oil Company**

Toxilic—Maleic acid. **National Aniline Division Allied Chem. Corp.**

Toximul 250—Emulsifier. **Ninol Laboratories**

Transphalt—Asphaltic hydrocarbon resin. **Pennsylvania Industrial Chemical Corporation**

Transveyor—Compact, low-cost stacker. **Automatic Transportation Company**

Troykyd—Fungicides, puffing & bodying agents, anti-floating agents, anti-sagging agents, anti-settling agents, anti-skinning agents, wetting agents, dispersing agents. **Troy Chemical Co.**

Triangel—Carbon black. **United Carbon Co., Inc.**

Tribase—Stabilizers for vinyls. **National Lead Company**

Triclene—Trichlorethylene. **E. I. du Pont de Nemours & Company, Inc. Electrochemicals Dept.**

Tri-Homo—Homogenizing machinery. **Tri-Homo Corporation**

Tripentek—Tripentaerythritol technical. **Heyden Newport Chemical Corporation**

Triple Action—High speed colloid mills. **Troy Engine & Machine Co.**

Triton—Surface active agents. **Rohm & Haas Company**

Troluoil—Aliphatic petroleum thinner. **Anderson-Prichard Corporation**

Tulip—Tone colors. **Holland Color & Chemical Co.**

Tween—Emulsifiers; polyoxyethylene sorbitan fatty acid esters. **Atlas Powder Company**

Twitchell—Emulsifying agents. **Emery Industries, Inc.**

Ty-Bond—Zinc phosphate coating for metal. **Cowles Chemical Company**

Typhoon Agitator—Portable liquid mixer. **Patterson Foundary & Machine Company**

U

Ucon—Product trade name. **Union Carbide Chemicals Co., Div. Union Carbide Corp.**

Ubatol—Modified polystyrene emulsion. **Union Bay State Chemical Co., Inc.**

Uformite—Urea formaldehyde and melamine-formaldehyde resins. **Rohm & Haas Company**

Ultrapole S—Amine condensate. **Ultra Chemical Works, Inc.**

Ultra-Turrax—Colloid Mills. **Cartrite International, Inc.**

Unapex—Latex paint base. **Naftone, Inc.**

Uneek—Universal vehicle. **Farnow, Inc.**

Unimixers—Vertical liquid mixer. **Patterson Foundry & Machine Company, Div. of Ferro Corp.**

Unipower—Agitator-mixer drive. **Patterson Foundry & Machine Company, Div. of Ferro Corp.**

Unitane—Titanium dioxide pigment. **American Cyanamid Co. Pigments Div.**

Unitol—Refined Tall Oil. **Union Bag & Paper Corporation**

Uplifter—Portable elevator. **Revolvator Co.**

U.S.I. Isosebacic Acid—Mixture of isomers of sebacic acid. **U. S. Industrial Chemicals Co.**

USS—Aromatic hydrocarbon solvents. **United States Steel Corporation**

USCO Resin—Oil-modified alkyd. **U. S. Coatings Co**

USSCO—Ball mills. **The U. S. Stoneware Co.**

Utilitank—Glass lined storage tanks. **The Pfaudler Company**

Uversol—Driers. **The Harshaw Chemical Company**

Uvinul—Ultraviolet absorbers. **Antara Chemicals, Div. of Gen'l Aniline & Film Corp.**

V

Vac Dry—Bleached shellac gum. **William Zinsser & Co., Inc.**
VAGH—Vinylchloride-acetate resins. **Union Carbide Plastics Co.**
Vale Green—Chrome green pigment. **Imperial Paper & Color Corp.**
Vancide—Fungicides. **R. T. Vanderbilt Co.**
Vandor—Paint deodorant. **van Ameringen-Haebler, Inc.**
Varayd—Alkyds. **Farnow, Inc.**
Varez—Resin solutions. **McCloskey Varnish Co.**
Vari-Visco—Filling machine. **The Karl Kiefer Machine Co.**
Varkydols—Special drying oils. **McCloskey Varnish Company**
Varkyds—Alkyds, phthalic, non-phthalic and modified. **McCloskey Varnish Company**
Veegum—Magnesium aluminum silicate. **R. T. Vanderbilt Company**
Velsicol—Hydrocarbon resins and aromatic hydrocarbon solvents. **Velsicol Corporation**
Velvet Green—Chrome green pigment. **Imperial Paper & Color Corp.**
Velveteen "R" Silica—Amorphous silica. **Tamms Industries, Inc.**
Venus Natural Copper—Flake Copper Powder. **U. S. Bronze Powder Works, Inc.**
Venus Palegold—Gold bronze powder. **U. S. Bronze Powder Works, Inc.**
Vera Blanc—Water ground calcium carbonate. **DeLore Div., National Lead Co.**
Versamides—Polyamide resins. **General Mills, Inc.**
Vibrin—Polyester resins. **Naugatuck Chemical**
Vi-Cron—Very fine ground limestone. **C.K. Williams & Company**
Vinac—Polyvinyl acetate resins and emulsions. **The Colton Chemical Company**
Vinsol—Resin derived from southern pine wood. **Hercules Powder Company**
Vinsol Ester Gum—Gylcerol ester of vinsol. **Hercules Powder Company**
Vinylite—Vinyl resins: acetate, chloride-acetate, chloride, alochol and butyral. **Union Carbide Plastics Co.**
Vinymul—Polyvinyl acetate emulsion. **Morningstar-Paisley, Inc.**
Violite—Luminescent pigments. **Rhode Island Laboratories, Inc.**
Virginia Red Toners—Chlorinated lithol rubine **Standard Ultramarine & Color Co.**
Viskoplus—Aluminum naphthenate. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Vistac—Rubber plasticizers. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
VMCH—Vinyl chloride-acetate resins. **Union Carbide Plastics Co.**
Voidox—Tertiary butylated phenol. **Guardian Chemical Corporation**
Vulcan—Oil furnace carbon black. **Godfrey L. Cabot, Inc.**
Vulcan—Steel shipping containers. **Vulcan Containers, Inc.**
VVF Pigments—Very fine natural iron oxides. **C. K. Williams & Company**
VYCM-1-2—Vinyl chloride and vinyl **chloride**-acetate resins for dispersion coatings. **Union Carbide Plastics Co.**
VYCM-3—Vinyl chloride-acetate resins. **Union Carbide Plastics Co.**
Vygen—Polyvinyl chloride resin. **The General Tire & Rubber Company**
VYHH—Vinyl chloride-acetate resins. **Union Carbide Plastics Co.**
VYLF—Vinyl chloride-acetate resins. **Union Carbide Plastics Co.**
Vynite—Collapsible tubes for paint pigments, **Continental Can Company, Inc.**
VYNS-Vinyl chloride-acetate resins. **Union Carbide Plastics Co.**
VYNV-1-2—Vinyl chloride and vinyl chloride-acetate resins for dispersion coatings. **Union Carbide Plastics Co.**
VYNW-5—Vinyl chloride-acetate resins. **Union Carbide Plastics Co.**

W

Wallkyd—Alkyd resin vehicles. **Reichhold Chemicals, Inc.**
Wallpol—Plasticized vinyl acetate emulsion. **Reichhold Chemicals Inc.**
Walltax—Wall sizings. **Hayes Adhesives Co, Inc.**
Watchung—Permanent red 2B pigments. **E. I. du Pont de Nemours & Company**
WC-130—Polyvinyl acetate emulsion. **Union Carbide Plastics Co.**
Weather-Ometer—Accelerated Weathering Machines. **Atlas Electric Devices Company**
Wetall—Wetting agent. **Scher Bros.**
Wet-Ege Spirits—Aliphatic hydrocarbon thinner **Anderson-Prichard Oil Corporation**
Wemco—Torque flow solids pump. **Western Machinery Company**
Witall—Tall oil driers. **Witco Chemical Co.**
Witcarb—Precipitated calcium carbonate. **Witco Chemical Company**
Witicizers—Plasticizers. **Witco Chemical Co.**
Witco—Paint driers, surface active agents, & stearates. **Witco Chemical Company**
Witcoblak—Furnace or channel blacks. **Witco Chemical Company**
Wittox—Copper & zinc naphthenates. **Witco Chemical Company**
Wonex—Soda-treated wood rosin. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**

X

Xacto—Positive displace meter. **Bowser, Inc.**
XR-859, XR-875 Resins—Silicone — phenolic resins. **Dow Corning Corporation**
XX—Lead-free zinc oxide. **New Jersey Zinc Co.**
XYHL, XYSG—Vinyl butyral resins. **Union Carbide Plastics Co.**

Y

Yelkin—Lecithin—**Ross & Rowe, Inc.**

Z

Zeco—Ashalts, stearine pitches, gilsonite. **G. S. Ziegler & Company**
Zeolex—Ultra fine silico aluminate. **J. M. Huber Corporation**
Zinar—Zinc resinate. **Newport Industries, Inc., Div. of Heyden Newport Chemical Corp.**
Zinol—Zinc resinate solution. **Newport Industries, Inc., Div. of Heyden Newport Chemical Corp.**
Zirco—Drier catalyst. **Advance Solvents & Chemical Div. of Carlisle Chemical Works, Inc.**
Zirex—Zinc resinate. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**
Zitro—Zinc resinate. **Newport Industries, Div. of Heyden-Newport Chem. Corp.**
Zopaque—Titanium dioxide. **The Glidden Company**
Zulu—Phthalocyanine blue & green pigments. **Kentucky Color and Chemical Company**

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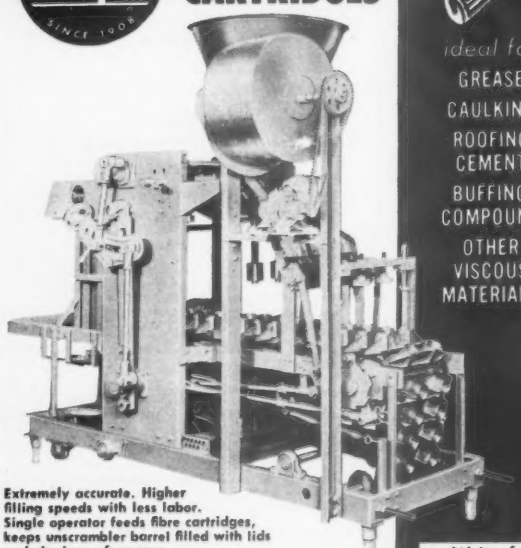

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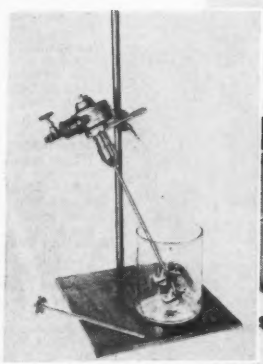

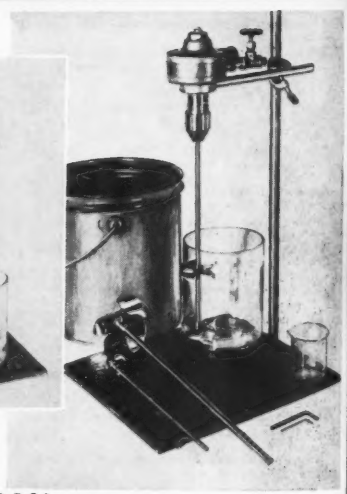

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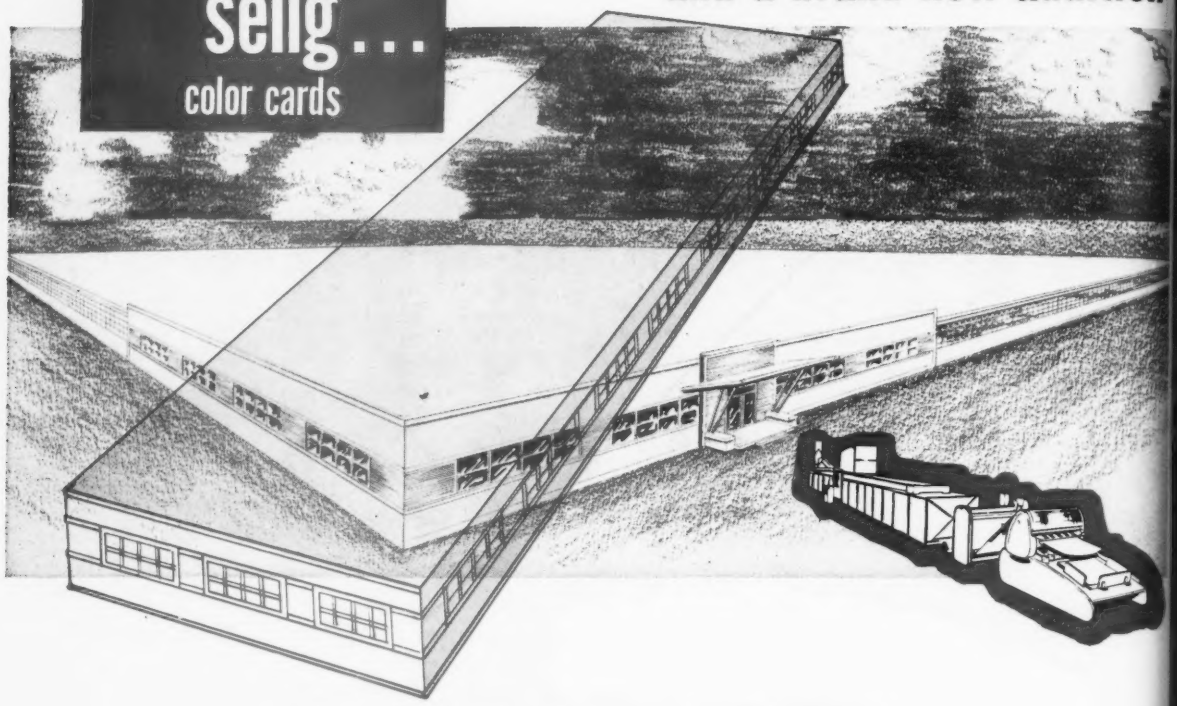

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